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Contents

NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Utilisation of Hardened Oils

IN this issue our technical articles are solely concerned with the scientific problems arising in connection with those industries in which animal and vegetable oils form the staple raw products. Mr. G. D. Elsdon, the public analyst to the Borough of Salford (who, by the way, is now engaged on the preparation of a book which will form one of Ernest Benn's "Technical Chemical Series") writes on "The Separation of Fatty Acids," while another article dealing with "The Purification of Oils" is contributed by Dr. W. W. Myddleton, who will be well known as the co-author of the recently published volume on "Synthetic Fats." While speaking of Dr. Myddleton our mind goes back to the opinions he has quite rightly expressed in connection with the difficulties associated with the utilisation of the synthetic fat products. These difficulties, of course, were made to be overcome; but it is, perhaps, not generally appreciated that considerable trouble has in the past arisen in every industry in which hydrogenated oils have been called into use. In many of the common oils of commerce employed for soap-making the fatty acids present form a mixture which gives the maximum lowering of surface tension, and the addition of a little more of any one of the constituent acids results in the formation of a soap inferior in surface tension effect. It is then clear that a process such as that of hydrogenation must upset the natural balance of the acid mixture in an oil, and to this fact may be ascribed something of the harmful action of hydrogenated oils. A deleterious effect is traced to the so-called "new acids," containing more than 18 carbon atoms, and it has been said that unless the process of hydrogenation can in some way be modified so as to prevent the formation of the new acids, it would seem that the most promising suggestion with regard to the utilisation of the hardened product in soap manufacture would be that the soap should be treated so as to mask or obliterate the action of these harmful bodies.

In connection with the provision of food substances it has been frequently taken for granted that synthetic fat could fully replace the natural products. Such, however, is not the case. The whole question of the mechanism of nutrition has acquired a new interest in the discovery that vitamins are essential if the body is to utilise efficiently the food supplied. Vitamins are, however, apparently destroyed in the process of hydrogenation. Numerous experiments have shown that the natural oils and fats used in the manufacture of foodstuffs are satisfactorily absorbed, that as regards digestibility they are equal to natural products, and that so far as food value reckoned in calories is concerned their case is proved beyond doubt—but their lack of vitamins should be drilled into the mind of the consumer. He who substitutes synthetic fats for the natural product must ensure that he obtains a sufficiency of vitamins in his other articles of diet, but presumably he does, for experience appears to show that synthetic edible substances seem fully to satisfy the conditions necessary for their general use by the public.

The Mustard Gas Decision

THE claim by Dr. Levinstein and Professor Green for an award for the invention and production of a "new form of mustard gas" was put before the Commission on Awards to Inventors in such a way that the decision was bound to be a knock-out blow to one party or the other. The Crown, as owners of the rights in Sir William Pope's Patent 142,857, held that that Patent covered everything that the claimants had done. The claimants as clearly held that neither their process nor their product was covered by the Pope specification; that their "invention" comprised the "manufacture, product, process, and plant of a new form of mustard gas" shortly described as "disulphide." The Tribunal, which heard the claim

with great patience and was extremely well qualified to try such a case, found that the Pope Patent completely covered the claimants' process and product; in other words, that the claimants had entirely failed to establish their case.

We prefer not to enter into the details of the case here beyond making one or two observations. The first is that having appealed to Cæsar one should accept Cæsar's decision. The second is that such disputes are not popular among chemists and rarely bring good to anyone. There are many who strongly regret what has taken place on this claim already; the number would be largely added to by further and possibly equally futile litigation. Dr. Levinstein and Professor Green complain that their war services to the country have not been acknowledged as they ought to have been, though they do not say exactly what the Government ought to have done. Supposing that to be true, how many thousands of cases are there of which the same might be said? It is on record to their credit that they produced, working on the basis of Sir William Pope's simple reaction, about 88 tons of mustard gas, as compared with about 560 tons produced at the Government factory at Avonmouth. If they have not received their full reward they are in the position of numbers of chemical, gas, and similar concerns who gave all they could to the nation in time of need and counted that sufficient satisfaction.

As to the patenting of the Pope reaction—a masterpiece of simplicity as compared with the German method—that was obviously necessary to protect the Government. The results of the researches conducted under Sir William Pope's direction were being practically broadcast among chemical firms so that the desired gas might be produced as speedily as possible on a commercial scale. It was to protect this information from being exploited to the personal advantage of anyone that the process for producing mustard gas by the absorption of ethylene in sulphur mono-chloride was protected by Patent. Although that Patent is in Sir William Pope's name it is due to the inventor to remember that all rights in it are assigned to the Crown, and that no question of personal profit can therefore arise. Some more detailed notes on the issues raised appear on p. 191.

Fatty Acids from Petroleum

One of the most interesting aspects of the present-day situation in the oils and fats industry is the possible entry, into the list of raw materials lending themselves to treatment, of the mineral oils. The suggestion that petroleum products might be converted into fatty acids and thence into glycerides is by no means new; but the fact that the idea is faced with considerations, both economic and chemical, which make it extremely speculative, has lent all the more attraction to its possibilities. Purely from an economic standpoint it might be argued that the industrial chemist is wasting his time by giving any attention to the proposition, for the supply of vegetable oils, even supposing the sources of animal fats are precarious, is almost unlimited and is renewable each year, while so far as petroleum oils are concerned we are always being warned that in about another decade we shall be getting dangerously near the bottom of nature's store. On the other hand, there are large quantities of more or less waste products from distillation processes containing appreciable proportions of hydrocarbons which, with the aid of chemical manipulation, might conceivably yield decidedly serviceable products.

So long as fats continue to form an indispensable part of the human diet, so long must it behove us to examine every possibility of increasing the supply, and although from the chemist's point of view the problems associated with the treatment of petroleums are of extreme complexity their solution may well confer untold benefits on the next generation, if not on this. The first stage in the work of investigation would seem to be a far more comprehensive study than has yet been attempted, the exact chemical composition of the natural petroleums, for our knowledge in this respect is still very limited, and there are great difficulties involved in the separation of the individual ingredients. For the moment we can, perhaps, afford to neglect any question of economics which must subsequently arise, and be content to treat the whole matter in the light of a scientific curiosity which, purely from the standpoint of its scientific attraction, is well worth the endeavour and interest of the modern research worker.

The parlous state of affairs in Germany in connection with the supply of fatty acids during the later years of the war will still be fresh in the minds of most of us, and it was undoubtedly the crying need for augmenting the supply which prompted the German war-time workers to experiment with the oxidation of petroleum oils. At the time a good deal was heard of German claims to have established the process on a commercial scale; but chemists in other countries who have attempted to repeat the operation are inclined to regard the whole matter as something of the order of a mare's nest. It has been said by two authoritative writers that although this work must not be wholly discredited, the fact remains that very contradictory reports are current as to the results obtained by workers attempting to repeat the German experiments, or to apply them on an industrial scale. The work, in fact, is often of a purely empirical "hit and miss" type, and in view of the indefinite nature of the raw materials it is not surprising that different results should be obtained by different investigators. However sceptical one may be as to the ultimate success and utility of such processes, there can be no gainsaying the fact that the oxidation of the natural paraffin is a problem of intensely absorbing interest to the chemist, and must undoubtedly produce the most valuable results for chemistry even if it fails to establish itself as commercially practicable. It should by no means be a matter for discouragement that the attack on the problem so far as it has gone has, as yet, revealed only the difficulties rather than their solution.

Floating Roofs for Storage Tanks

The problems associated with the storage of volatile liquids seem to be exercising the ingenuity of quite a number of fuel and chemical engineers just at present. Only recently we referred to the by no means immaterial losses which may occur when no particular precautions are taken or no modifications in the design of the ordinary form of tank are introduced. All forms of petroleum products are now a rising market, and

naturally they are dragging up the price of other products, such as coal-tar distillates, with them. Accordingly, the increased value of materials of the kind stored in bulk must necessarily bring into greater prominence the question of storage losses, and almost daily there is being developed and placed on the market equipment designed especially to reduce these losses. In America, among the recent developments is a new type of tank roof known as the " floating roof," and it is said that it practically eliminates the vapour space over the surface of the oil, thus almost removing the effect of " breathing " to which we have referred on a previous occasion. The U.S. Bureau of Mines has, as usual, been in the forefront in the work of investigating the practical value of the suggestion, and has lately completed tests on tanks equipped with one particular design of floating roof.

There are at present at least two types of floating roofs, which, while similar in fundamental principle, differ mainly in the method of making contact with the inside shell of the tank. One type is known as a floating tank deck, and has on its circumference flexible metal baskets containing gravel that rest against the inside shell of the tank. In the other type contact with the tank shell is made by the use of moveable buffers or shoes. These are attached to the outer ring of the roof, and are pressed against the tank shell by means of springs. The primary function of the floating roof is to reduce evaporation losses by eliminating the vapour space above the oil, thus preventing breathing losses and losses due to circulation of air over the liquid. By elimination of the vapour space the fire risk is also reduced in that there is no large confined space filled with explosive vapour, nor is there any large body of liquid exposed to the air With this type of construction the exposed liquid is in a very narrow slot of sufficient depth to prevent free circulation of the air which is necessary to support combustion. Those who are anxious to follow up the problem in greater detail would do well to apply to the Bureau of Mines for Pamphlet No. 2547, which gives full particulars of the results relating to these tests.

Physical Society's Jubilee

MARCH 21 next will be the anniversary of the first meeting of the Physical Society of London fifty years ago, and the Council has fixed the three days, March 20, 21, and 22, for the jubilee celebrations. These will include a reception and the delivery of the Guthrie Lecture on March 20, a meeting devoted to reminiscences by original Fellows and other Fellows of long standing on March 21, and a banquet on March 22. At the last function many distinguished guests are expected to be present. The Duke of York has consented to attend and the Prime Minister and Viscount Haldane have also accepted invitations. The occasion, one of exceptional interest in the history of the Society, promises to be worthily celebrated.

Dyers' Record Profits

THOSE who have been depressed so often by hearing that the exorbitant prices of British-made dyes are ruining the textile trade may be cheered by the announcement that the Bradford Dyers' Association's profit for 1923 was £1,032,152, the largest in the history of the Association. The dividend for the year is to be 25 per cent., and £125,000 will be put to reserve. In the face of such figures it is difficult to take very seriously the claim that the prices of British-made dyes impose a fatal handicap on the British textile industry. We have not the percentages by us at the moment, but it is well known that the cost of the dyestuff in proportion to the cost of the finished textile is very small indeed. The figures respecting our textile trade show how little the trade is affected by the advance in dyestuff prices over the pre-war standards.

Points from Our News Pages

Special articles are published on " The Purification of Oils," by Dr .W. W. Myddleton (p. 186); " The Separation of Fatty Acids," by Mr. G. D. Elsdon (p. 188); and " The Manufacture of Candles " (p. 190).

In view of the interest in the recent Mustard Gas Claim, we publish a special summary of the issues involved (p. 191).

Mr. D. M. Newitt, in a paper before the Institution of Chemical Engineers on Monday, dealt with the transport and storage of hydrochloric acid in rubber-lined wooden vessels (p. 192).

Questions were asked in Parliament on the proposed Anglo-German Dye Combine during the week (p. 198), and a deputation from the British Chemical and Dyestuffs Traders' Association visited the Board of Trade (p. 197), but little further information is available.

According to our London Market Report business was slightly brisker owing to the threat of the dock strike (p. 204).

The week was comparatively quiet in the Scottish Chemical Market, but an increase in the price of red lead is announced (p. 207).

Books Received

THE CHEMISTS' YEAR BOOK, 1924. Edited by F. W. Atack. Manchester: Sherratt and Hughes. Pp. 1,148. 21s.

THE "M.G.C." MANCHESTER YEAR BOOK, 1924. Manchester Manchester Guardian, Ltd. Pp. 172.

The Calendar

Feb. 25	Royal Society of Arts: Cantor Lecture: " A Study of the Destructive Distillation of Coal." (Lecture I.) E. V. Evans. 8 p.m.	John Street, Adelphi, London, W.C.2.
25	Society of Chemical Industry (Newcastle Section): " Some Aspects of the Physical Testing of Moulding Sands for Foundries." C. H. Holmes. 7.30 p.m.	Armstrong College, Newcastle.
26	Chemical Engineering Group: Joint Meeting with the Institution of Mechanical Engineers: Symposium on " The Treatment of Water for Industrial Purposes." 6 p.m.	Institution of Mechanical Engineers, Storey's Gate, S.W.1.
28	Chemical Society: Hugo Müller Lecture. Professor J. Joly. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, S.W.1.
28	Royal Society: Papers by Professor O. W. Richardson, Professor W. A. Bone, D. M. Newitt, D. T. A. Townend, and J. E. P. Wagstaff. 4.30 p.m.	Burlington House, Piccadilly, London,
28	Royal Institution of Great Britain: " Crystalline Structure of Organic Substances " (Lecture IV). Sir William Bragg. 5.15 p.m.	21, Albemarle Street. London, W.1.
29	Chemical Engineering Group: " Kinetic Elutriation." L. Andrews.	London.
Mar. 3	Royal Society of Arts (Cantor Lecture): " A Study of the Destructive Distillation of Coal " (Lecture II.) E. V. Evans.	John Street, Adelphi, London, W.C.2.
3	Society of Chemical Industry (London Section): Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, W.1.

The Purification of Oils

By W. W. Myddleton, D.Sc.

The writer deals seriatim with the individual purposes for which oils are used, and discusses the individual properties which should be sought for in each instance and the constituents which should be retained or eliminated.

Our knowledge of the chemical composition of the oils has been extended considerably during the last twenty years. The commercial processes employed for the refining of oils have become more numerous and more efficient as the problems of chemical composition have been elucidated.

Modern processes for the treatment of oils are so varied that it becomes necessary to attach a much wider meaning to the term " purification " than is ordinarily implied.

The purification of oils is now to be regarded as the removal or modification of substances which prevent the oil from functioning efficiently when used for a specific purpose.

This definition implies that it is not always necessary or desirable to remove all substances other than triglycerides, and that it is sometimes essential to allow certain non-fatty substances to remain in the oil. The animal oils, for example, should be allowed to retain their vitamins in an active condition if they are intended for edible purposes. As a further example the denaturing oils prescribed under the various tariff schedules are intended to retain their characteristic chromogenetic substances so that they can be identified in the denatured oil which has paid a smaller duty by a simple colour reaction.

The bleaching processes which involve the action of sunlight or ultraviolet light and the use of ozone do not aim at the removal of colouring matter but its conversion into a colourless substance which remains in the oil.

The definition I have given is wide enough to cover the partial hydrogenation of fish oils and whale oil to destroy their characteristic and objectionable odour and taste, and partial hydrogenation of linseed and other oils to improve keeping properties. In the fish oils the effect of hydrogenation is to convert the highly unsaturated glycerides, which are the objectionable constituents, into less unsaturated compounds by addition of hydrogen. The keeping properties of oils containing glycerides of linolenic or more highly unsaturated acids are improved by converting these substances into olein and stearin, which do not become rancid so readily.

It is obviously impossible to give an adequate survey of the methods of oil purification at present in use in this article, and indeed many of the methods are described in detail in the text books concerned.

The more recent work on oil purification will therefore be discussed from the point of view of the industry for which the purified oil is destined.

Edible Products

The methods of treatment of the edible oils are few in number. The object of the refiner is to present a product of good appearance of pleasant odour and flavour, and which will keep well on storage and will have the best digestive properties.

The appearance is largely determined by the moisture content and the nature and amount of the colouring matter present. In the case of salad oils it is necessary that the solid glycerides which form a supersaturated solution in the liquid glycerides of the freshly expressed or extracted oil should be reduced in amount, so that the appearance of the oil may not be marred by the deposit of a stearine in cold weather. The removal of the excess solid glycerides is a matter of chilling followed by filtration.

In other cases, as for example where the oil is to be employed in margarine manufacture, the stearine content is not so important. The keeping properties are dependent upon the amount of the glycerides of linoleic, linolenic and the more highly unsaturated acids present, but these are of minor importance when storage conditions are good and when other substances, proteins, mucilage, and certain bacteria and fungi are carefully removed. Rancidity quickly develops where these substances are all present, especially if the oil is exposed to light and air.

The presence of free fatty acids, while encouraging the development of rancidity in products containing proteins, mucilage, and moisture, are not objectionable in small amount in an edible oil from which these substances have been removed. In fact the perfectly neutral oil has an insipid taste which is rendered much more pleasant by the addition of small amounts of fatty acid.

Mucilage and some of the colouring matter are frequently removed by prolonged storage or tanking of the oil. A more complete sedimentation is effected by stirring the oil with a solution of boric acid.

The boric acid precipitate from cotton-seed oil was found by Thurman* to represent 1·445 per cent. of the weight of oil treated and to contain free fatty acids 0·957 per cent. of the original oil. The non-fatty matter comprising proteins and colouring matter thrown down formed 0·578 per cent. of the original.

A cotton-seed oil soap stock, obtained as a deposit by agitating the oil with a solution of caustic soda, was found by the same investigator to represent 11·8 per cent. of the original oil. 50 per cent. of the soap stock was actually derived from the oil, the remainder having its origin in the water and soda of the solution used. The non-fatty matter precipitated formed 1·37 per cent. of the original oil, more colouring matter being thrown down than when boric acid solution was employed. The removal of free fatty acids was, of course, more complete.

Sodium carbonate was found effective in neutralising free acidity, but only small amounts of proteins and colouring matter are retained by the soap formed.

Lime, although troublesome on account of emulsification, is capable of throwing down some of the colouring matter not amenable to treatment with caustic soda, fuller's earth or carbon.

Caustic soda solution appears to be the best preliminary refining agent, although when the process is carried out in open pans it is difficult to remove residual quantities of the free fatty acids in spite of the fact that it is customary to use more than the theoretical amount of alkali for this purpose. An oil containing moderate amounts of free fatty acids dissolves a considerable amount of the soap formed and washing with water becomes necessary. The soap stock, too, is difficult to handle, for it contains, in some cases, as much as 20 per cent. its weight of neutral oil. In the process of Edouard Bataille† the oil is mixed with the theoretical weight of caustic soda solution of 20° Bé strength (1 lb. = 1 lb. fatty acids in the oil) in a steam jacketed vacuum kettle fitted with stirring gear. The temperature is raised to 55°C., and after neutralisation the moisture is removed by evaporation under diminished pressure. After treatment for from 1½ to 3 hours, the neutralised oil is sent to ordinary refining tanks to settle. The colouring matter is removed by this process just as efficiently as in the ordinary process, but the soap stock is dry and settles without leaving soap dissolved in the oil. Washing is thus eliminated. The oil retains approximately 0·01 per cent. free fatty acids.

The Bataille process has been in operation on a considerable scale since 1915, when the first plant was erected at Malaga, Spain.

Bleaching of Edible Oils

A further removal of colouring matter is effected by agitation with fuller's earth or charcoal or a mixture of the two. The earth is in some cases derived from clays by extraction with mineral acids, but as a rule the natural fuller's earth is employed.

Here again there are two alternatives in the treatment. By agitation in open pans at from 50°-70° C., cotton-seed, soya and maize oils are bleached by 1·5 per cent. of the earth. If the oil is mixed with the earth in the vacuum kettle, about half the amount of earth is required. The importance of this reduction lies in the fact that fuller's earth always retains from 25-30 per cent. of its weight of oil even after washing and steaming.

Large amounts of the earth are liable to impart an earthy flavour to the oil.

* *J. Ind. and Eng. Chem.*, 15, 395 (1923).

† See Whiton, *Chem. Age*, (*N. York.*) 31, 505 (1923).

The Bataille vacuum bleacher was first erected in Bucharest in 1914. Its efficiency is probably due to the thorough drying of both oil and bleacher.

Deodorisation

The freshly expressed or extracted oils and also the hydrogenated oils possess a distinct and sometimes undesirable odour and flavour. Deodorisation is in each case effected by passing a current of steam through the oil in a vacuum kettle.

The steam is preferably generated by heating water in a vacuum kettle heated by steam from an ordinary steam generator. If steam from the boiler is utilised directly a peculiar odour and flavour are developed in the oil and metallic salts tend to find their way into the product.

The effective steam is generated under a pressure of 5 in. of mercury, and its temperature is therefore about 57° C. The volume occupied by 1 lb. of steam under this pressure and at the temperature at which it is generated is approximately 1,400 cubic feet. The volume of steam passed through the oil is more important than its actual weight, so that there is a distinct advantage in reducing the pressure still further and raising the temperature of the steam.

In the Bataille installation it is possible to treat the oil under a pressure of 0·26 in. mercury. The steam generated under 5 in. pressure is passed through a superheating tube heated by steam at a pressure of 125 lb. per sq. in.

The volume occupied by 1 lb. of effective steam under these conditions is over 3,000 cu. ft.

The losses during deodorisation are due mainly to the volatilisation of free fatty acids, and it must be noted that the distillate may contain free fatty acids in amount more than three times that to be expected from the free acidity of the treated oil.

Paint and Varnish

In addition to the precipitation of proteins and mucilage by tanking it is possible to satisfy the requirements of this industry by refining with either concentrated sulphuric acid or with caustic soda solution. In the acid process the oil is warmed with fairly concentrated sulphuric acid. The mucilage is somewhat charred and settles readily on standing.

It is essential to wash the oil well after treatment with acid so as to remove all sulphonated glycerides and fatty acids.

Sulphonated compounds cause thickening of paint during storage and the development of a yellow colouration. Acid-treated linseed oil is satisfactory for the preparation of paint, since it possesses excellent adhesive power.

For varnishes and enamels the acid-treated oil is inferior to the alkali-refined product. Even after thorough washing the acid-refined article undergoes considerable hydrolysis on heating. The alkali-refined linseed oil must also be washed well so that no alkali metal compounds are left in it.*

Soap and Candles

During the manufacture of soap and candles the oil is saponified or hydrolysed so that free fatty acids are not objectionable except in so far as they are liable to give rise to the development of rancidity during storage prior to use. Rancid oils are objectionable. The percentage of highly unsaturated glycerides should be reduced to a minimum by partial hydrogenation. On the one hand, the soaps of highly unsaturated fatty acids usually possess or develop an objectionable odour and readily undergo oxidation, with resulting deterioration in lathering and detergent properties.

On the other hand, the expressed oleine from mixed fatty acids employed in the preparation of candle stearine finds its way into the soap industry or is used in wool scouring. If highly unsaturated fatty acids are present in the oleine its market value is considerably reduced, for not only do the soaps suffer in the manner indicated, but the heat generated by oxidation of the oleine itself is sufficient to render the substance unsafe for use in scouring.

Careful consideration is required as to the method of hydrogenation which will reduce the percentage of highly unsaturated acids to a safe point without producing too large a proportion of solid acids.

In soap manufacture the solid acids should form no more than about 50 per cent. of the total acids entering into the composition of the soap. In candle manufacture also it is undesirable to produce too large a proportion of solid acids, for it then becomes impossible to remove the oleine successfully by pressing.

Lubricating Oil

The oils used for this purpose should contain very little free fatty acid, so that alkali refining is preferable to acid treatment. Rancidity is again to be guarded against, for rancid oils give rise to resinous deposits in the warm bearings.

Synthetic Fats

The refining of oil for the process of hydrogenation has not received the careful consideration it deserves. It is stated that the fish oils, which are somewhat difficult to hydrogenate, can be rendered amenable to treatment by agitation with insufficient caustic soda solution to neutralise the free fatty acids. The example quoted is the treatment of 50 gms. of oil with 2·5 cc. of a 20 per cent. solution of the alkali. The fish oil may then contain between ·32 and 10 per cent. of free fatty acids and yet hydrogenate satisfactorily.

The Future of Extracted Oils

The refining of oils after extraction is said to lead to smaller losses than when the oil is expressed. It would also seem possible to carry out refining with alkali while the oil is in the solvent.†

Traces of the solvent can be successfully removed by steaming, and the question of detection of very small residual amounts is receiving attention,‡ so that the prejudice against the solvent process in connection with the preparation of edible products will probably disappear in the near future.

In the same way the oil cakes from the solvent process will probably find their way into general favour.

It should be mentioned, however, that the solvent process will hardly prove satisfactory for the preparation of drying oils, for it is well known that the expressed oil dries much better than the oil extracted from similar seed. Here, of course, practically the whole of the oil content of the seed is removed by the solvent, whereas the expression process leaves behind a residual amount of oil rich in saturated solid fats, substances which take no part in the process of drying.

One feature of the extraction process deserves some consideration. Given a solvent in which oils do not dissolve in all proportions at ordinary temperatures and such that a contraction in volume occurs when solution of oil does take place, it would be possible to extract the oil from the seed fairly completely at ordinary temperatures by bringing the seed into contact with the solvent under pressure.

The solubility of the oil in the solvent would be increased by the application of pressure and the solution when run into a vessel at a lower pressure would deposit some oil containing very little solvent. The supernatant solvent containing some dissolved oil might be circulated indefinitely through the pressure vessel. The removal of solvent would then be a matter presenting very little difficulty.

Whether such a solvent may be found or is actually in use remains to be seen, but, apart from these considerations, there seems to be a bright future for the solvent process, so that the detection and removal of small amounts of solvent in extracted oils must engage the attention of the oil refiner in the near future.

Bleaching by Ozone

The bleaching of oils by ozone is an interesting possibility which has recently received attention. In the case of linseed oil, Hartman§ found that a preliminary refining with alkali is necessary. The oil was agitated with 0·15 lb. alkali silicate (3 vols. 22 Bé. caustic soda, 1 vol. 22 Bé. sodium silicate) for each 1 per cent. free fatty acid in each gallon of oil.

The mixture was heated until the emulsion showed signs of breaking. Washing with water and treatment with fuller's earth completed the preliminary treatment. An alternative method was to use 0·1 lb. sodium silicate of the strength indicated for each 1 per cent. free fatty acids per gallon of oil.

The oil was transferred to a lead-lined kettle fitted with a propeller stirrer. Ozonised air containing 0·5 per cent. ozone was admitted directly below the propeller. 15 gms. ozone were required per gallon of oil and treatment lasted for five hours.

It is emphasised that the previous history of the oil should be known, cold pressed oil being most readily treated. Tanked oil, after some time, does not bleach well.

* Schwareman, *Drugs, Oils and Paints*, 425 (1923).

† *Cotton Oil Press*, 4, No. 12, 1922, 29; 4, No. 12, 1921, 42.
‡ Masahiro Aida, *J. Soc. Chem. Ind.*, 39 (1920), 152T.
§ *Journal Soc. Chem. Ind.*, 42, 124T. (1923).

The Separation of Fatty Acids

By G. D. Elsdon, B.Sc., F.I.C.

Attention is drawn to the lack of methods for determining with reasonable ease the quantitative composition of mixtures of fatty acids. Important as it is, the problem of separating fatty acids does not seem to have been solved, although the writer holds out hope that more expedient methods may shortly be discovered

It is a deeply unfortunate circumstance that the matter contained in this article is a record of failure rather than of success, and that, although there have undoubtedly been notable advances even within the last ten years, the means of separating quantitatively mixtures of fatty acids which we now have at our disposal are almost barbaric, whilst even their qualitative detection is not always easy, and may even border on the improbable. That this opinion is not an isolated one is shown very well by the fact that in the 5th edition of Lewkowitsch two hundred pages are devoted to the more or less empirical methods which are used for the examination of oils, whilst strictly scientific methods, which in nearly every case are described as inconclusive, occupy sixteen pages only.

The mixed acids as obtained by the saponification of oils and fats consist very largely of the higher members of the acetic acid series with oleic and other more highly unsaturated acids. The acids obtained from non-drying oils usually contain only a small portion of unsaturated acids other than oleic, whilst drying oils contain large amounts of other and more highly unsaturated acids—linseed oil for example, contains linolic ($C_{18}H_{32}O_2$) and linolenic ($C_{18}H_{30}O_2$) acids. In spite of the very great technical importance of this oil a recent text book* has to admit, in regard to its composition, "This is not fully established . . . the proportion present of linolenic acid would be 21 per cent. The solid acids appear to be myristic and palmitic acid in about equal proportions; total 7-10 per cent. The percentage of linolic and oleic acids is doubtful."

The importance of being able to determine with reasonable ease the quantitative composition of the mixtures of acids obtained by the saponification of oil and fats cannot be overestimated, if it were possible to do this the identification of unknown oils or the determination of their purity or otherwise might be comparatively simple, even taking into consideration the variations which occur in natural products. At the present time, however, it is not possible to determine with reasonable accuracy and speed the amount of any one single fatty acid in any ordinary oil. Probably the nearest approach to this ideal that we have at present is the determination of arachidic† (and lignoceric) acid in arachis oil, but even in this case the method is tedious and far from absolute, whilst the results obtained are at the best an expression of the amount of a mixture of two acids obtained under empirical conditions. Another somewhat similar but even less satisfactory method is the well known one of Hehner and Mitchell for the determination of stearic acid. This method, under certain conditions, although tedious, is capable of giving useful results, but these are probably never absolute, and in many cases certainly vary considerably from the truth. From this general condition it follows that for the purposes of testing oils and fats we have to use figures such as the iodine value, saponification value, and Reichert value, which are, of course, average values to which each of the various constituents of the oil bears its share and which do not depend, in most cases at any rate, on the proportion of any individual constituent.

The separation of such a complicated mixture of many substances having very similar or graduating properties into its individual members appeared so difficult that at first the idea of the workers engaged in this field was to separate the constituents into two or more classes before the further separation into individuals was attempted. The most important of such early suggestions was that of Hehner and Angell,‡ who divided the mixture of fatty acids obtained by the saponification of edible fats into those which were soluble and those which were insoluble in water. From this has sprung the well known Reichert test (with its modifications and extensions), which deals, however, with the volatile rather than the soluble acids, although broadly speaking the same acids are concerned in both tests. It is necessary to emphasise, however, that this separation is only into two classes, and that the volatile (or soluble) acids, which are in every case present in small amount only and in some cases (*e.g.*, linseed oil) entirely absent, consist of *mixtures* of the lower fatty acids and not of one individual member. Even in the method of Kirschner, which depends largely upon the amount of butyric acid present, there is no exception to this rule, as coconut oil, which contains no butyric acid, gives a considerable positive value by this process.

Another suggestion on somewhat similar lines to this separation into soluble and insoluble acid is that for separating the solid and liquid acids, which, in practice, means the separation of oleic acid and other unsaturated acids from the higher saturated acids. This process depends upon the easy solubility of lead oleate in ether and petroleum ether, whereas lead stearate and the lead salts of the other higher saturated acids are practically insoluble in either. This method, however, is by no means absolute, and Lewkowitsch gives as his opinion that this should be looked upon as a partial separation only, which opinion is shared by the majority of those who have attempted the process. Many other methods have been suggested for the same purpose, but none of them has yielded results of much greater interest or usefulness than the lead-salt-ether method for the particular purpose for which it was devised.

Seeing that the methods suggested for separating the various fatty acids into groups are thus merely approximate, it follows that the further and more complicated problem of separating individual fatty acids is still more difficult, yet notwithstanding this the matter has, in some cases, reached quite an equally advanced stage, and in some cases the results so far obtained have been even more encouraging. The method of separating arachidic acid which can be crystallised from 70 per cent. alcohol and afterwards from 90 per cent. alcohol has already been mentioned above. Similar methods have been suggested, with varying degrees of success, for various acids such as erucic, behenic and stearic acids. Many processes depending upon the solubility of various salts of the individual fatty acids have been proposed, but in these cases, as in all others, the great difficulty is that the properties of the salts of the different acids merge gradually one into another, and there is no sharp line of demarcation between them. The method of Kirschner mentioned above depends upon the solubility of silver butyrate in water, whilst the salts of the acids higher than butyric are practically insoluble. This word *practically* is, however, the stumbling-block, for the solubility of the silver salts verge one into another so that complete separation is not possible. The solubilities of the silver salts of various fatty acids in water and in dilute silver nitrate solution are given by O. Jensen¶ as follows :—

Salt.	Solubility grams per 100 c.c. In water.	In N/10 $AgNO_3$ solution.
Butyrate	0·489	0·347
Caproate	0·089	0·029
Caprylate	0·018	0·005

It follows, therefore, that although a fair separation may be effected in this way a truly quantitative separation in the usual "inorganic" sense is an impossibility. A method depending upon the same principle has been proposed by Phelps and Palmer,|| who use the quinine salts. They find, however, that the solubilities of the propionate and butyrate are so nearly the same that only a partial separation is possible in this case. They claim, however, that butyric acid may be separated from mixtures containing formic, acetic and butyric acids by means of the solubility of quinine butyrate (1 in 25) and the insolubility of quinine formate (1 in 16,000) and quinine acetate (1 in 2,000) in carbon tetrachloride.

* Oils, Fats and Waxes. Fryer and Weston.
† Evers, *Analyst*, 1912, **37**, 487.
‡ "Butter: Its Analysis and Adulterations," 1874.
¶ Zeits. f. Unters d. Nahrgs u. Genussm. 1905, 10, 266.
|| *J. Biol. Chem.*, 1917, **29**, 199.

A similar method for the separation of lauric and myristic acids has been proposed by Jacobson and Holmes,* who use for this purpose the difference of the solubility of the lithium and magnesium salts in water and 50 per cent. alcohol. A certain measure of success seems to have attended their efforts, but a quantitative yield was not obtained whilst only small quantities of material were used. The method, however, seems to be a useful addition to the known processes even though it is not yet perfect.

Various other methods have been proposed depending upon other salts and other solvents, but, although we must look upon many as useful since they are the only methods available and because they do give approximate results, yet complete success has not so far been attained, and indeed at the moment it is difficult to see in what way it will be brought about. It may be possible to devise a combination of methods which will effect a fairly approximate separation on quantitative lines, yet it would appear that any such process must of necessity be very laborious and quite unsuited for routine work.

Fractional crystallisation of the glycerides themselves seems to be a still more hopeless problem, although many attempts have been made the tedious nature of which may be gathered from the fact that in some of the earlier classical experiments kilograms of fat were fractionally crystallised from ether until only a few grammes of product were obtained. A somewhat more promising method has recently been described by Seidenberg.† This method depends upon the use of two miscible solvents one of which is more volatile than the other and has greater solvent power. The oil is dissolved in the mixture—say ether (in which the oil is freely soluble) and alcohol (which has little solvent action in the cold)—and air is drawn through the solution. Evaporation takes place, accompanied of course by a considerable lowering of temperature, and the glycerides separate in the order of their solubility. This method will doubtless be of great value in detecting the presence of beef fat in butter, and may even possibly be of value in the elucidation of the far more difficult problem of detecting beef fat in lard, but it is obviously of no value whatever for the quantitative separation of glycerides in general.

Fractional distillation of the glycerides *in vacuo* has been attempted by many workers. It was first shown to be possible by Chevreul, and the work has been continued by Krafft, Caldwell, and Hurtley and others. The method has given in many cases valuable information, but as a means of separating the various constituents of oils on a quantitative basis it shows no promise, and in any case the necessary apparatus and technique would be too elaborate for general analytical use.

The problem presents itself under three main divisions. In the first place simple methods are required for preparing reasonably large quantities of the individual fatty acids in a state of perfect purity. The difficulty of such work in the case of oleic acid is well shown by the work of Lapworth and Pearson,‡ who have pointed out that up to the present this acid has apparently never been obtained even in a reasonably pure condition, and that its properties, as contained in the literature, are scarcely approximately correct. The second division of the problem is that of determining with certainty the composition of each of the well-known oils and fats, whilst the third is the necessity of being able to determine with accuracy the actual amount of one or more of the principal constituents of a particular oil with the idea of deciding whether the oil in question is genuine or otherwise. Up to now most of the work which has been done on these lines has merely indicated the difficulties to be overcome and little real progress has been made, new ideas and suggestions are imperatively necessary, but the problems involved are so difficult that one almost despairs of success.

A process which has as great claims to attention as any yet suggested, and which is so interesting that it deserves attention in detail, is that which depends upon the fractional distillation of the methyl esters of the fatty acids. Although similar suggestions had been made before, the method was first seriously attempted by Haller§ and his collaborators, who prepared the esters by the action of excess of methyl alcohol on the oil, in the presence of a small quantity of hydrochloric or sulphuric acid. In this way they examined coconut oil, castor oil, and linseed oil, whilst several other oils have been examined by other workers. Generally speaking, all these workers seem to agree that the process has little quantitative significance, but that in spite of its obvious limitations it is an interesting and useful process.

In more recent years the process has received a great impetus by the work of Crowther and Hynd.¶ Somewhat similar methods have been used subsequently by Holland and Buckley,‖ but their results do not agree particularly well with those of Crowther and Hynd, the latter of whom appear to have taken far greater precautions. The fat used was butter fat in each case. Crowther and Hynd prepared the methyl esters in a similar way to Haller, but they introduced some important modifications to prevent the loss of volatile esters. They then distil the mixed esters at atmospheric pressure until a temperature of 150°-160° is reached and afterwards continue the distillation at 15 mm. pressure. This fractional distillation is repeated three or four times until a series of fractions is obtained which are assumed to contain only two saturated esters together with methyl oleate (experimental reasons for these assumptions are given), so that by the determination of the iodine absorptions and the saponification equivalent of each fraction it is possible to calculate the weight of each ester contained in it.

It is perhaps a little difficult to understand why the only one of the acids of high boiling point which appear in the lower fractions should be oleic, and also, to take one example, why in one of the lower fractions there should be 0·608 gramme of caproate, 0·320 gramme of caprylate and 0·160 gramme of oleate to the total exclusion of all other esters. The experience of the writer in the fractional distillation of large quantities of methyl esters obtained from coconut oil would, moreover, scarcely support this assumption, yet the results obtained from the examination of an artificial mixture of fatty acids prepared by Crowther and Hynd and examined by them certainly gives some ground for their contention. Their results are given in the following table :—

Acid.	Weight of esters calculated from weight of acid taken.	Weight of esters found by analysis.
Butyric	5·03	5·026
Caproic	1·89	1·854
Caprylic	1·21	1·240
Capric	1·41	1·467
Lauric	4·06	3·994
Myristic	21·76	22·108
Palmitic	15·30	14·950
Stearic	1·32	1·416
Dihydroxystearic	—	0·210
Oleic	41·98	41·675
	93·96 g.	93·940 g.

For the moment, therefore, the matter must be left at this stage, but the method is one that has, so far, given such promising results that it must be given a greatly extended trial. So far no method has given results which have so great a claim to accuracy, and it is therefore very necessary that all possible sources of error in the process shall be explored, and that, should the method be as valuable as the results given above appear to indicate, its true importance be realised at the earliest possible moment.

Throughout the above remarks it has been emphasised how difficult is the problem of the separation of fatty acids, and yet how important. That the measure of success so far reached is small when measured absolutely should not cause too much discouragement, since success, in a relative sense, there has been. Long and patient work will be necessary, but the increased value to the worker in the field of oils and fats which would follow the discovery of more expedient and more accurate methods of separation of the various fatty acids would amply repay all the labour involved.

* *J. Biol, Chem.*, 1916, **25**, 29, 55.
† *J. Ind. Eng. Chem.*, 1917, **9**, 855 ; 1918, **10**, 617.
‡ Food Investigation Board : Annual Reports, 1921, **4**, 29.
§ *Compt. rend.*, 1906, **143**, 657.

¶ Bicohem, J., 1917, **11**, 139.
‖ *J. Agri. Res.*, 1918, **12**, 719.

The Manufacture of Candles

Historical and other Notes on an Ancient Industry

THE history of candle-making, on a really scientific basis, properly begins with the great work of the French chemist, Chevreul, who discovered that fats are compounds of glycerin and fatty acids—or, in other words, are glycerides; and the main problem of early research with oils and fats was to find an efficient method of "splitting" fats into these two component parts. This is a chemical process, and is quite distinct from the mechanical operation of dividing fats into their solid and liquid constituents by pressure. The latter process was of great value to the candle maker, for the fat with its liquid portion squeezed out is a much better material for candle-making. In 1829 James Soames, of London, patented a method of separating coconut oil into its solid and liquid parts by pressure, and the patent was worked by E. Price and Co. for the manufacture of "coconut" candles and lamp oil. The same firm also introduced the use of coconut fibre mats instead of canvas in the pressing apparatus. Some improvements in wick manufacture were introduced in 1836, and in 1840 P. J. Wilson, of the firm of Price & Co., produced "composite" candles from equal parts of stearic acid (stearine) and coconut stearin, in which the plaited wick was first used. Jones and Wilson, associated with the same firm of Price & Co., in 1842-3 effected very considerable improvements in the steam treatment of fats, and in the production of a hard white fat by means of sulphuric acid treatment, distillation and pressing, whereby a great variety of raw material, hitherto unsuitable, became available.

Raw Materials Used

The earliest materials were various kinds of wax, chiefly beeswax, and tallow. One of the best and most valuable materials is the wax-like spermaceti of the sperm whale or cachalot. This is rather expensive, but the candles made from it give a brilliant and beautiful light. A little beeswax is usually added to prevent brittleness in sperm candles. Another animal wax is Chinese wax, produced by a small insect like a wood louse, which is bred on a large scale like the silkworm. Several kinds of vegetable wax are used for candle-making in China and Japan.

But the principal raw material used to-day, besides tallow, is mineral wax or paraffin wax. In 1848 Dr. James Young had his attention called to a little stream of oil running in a small garden on the top of a coal seam at Alfreton in Derbyshire. Two tremendous developments flowed in a very literal sense from this small stream. Firstly, it marked the beginning of the Scottish shale and paraffin oil industry and the subsequent utilisation of the enormous shale deposits in other parts of the world; and, secondly, it practically revolutionised the candle industry. The paraffin wax obtained by distillation of the shale oil was found to be a most valuable material for candles, so much so that we now have a gigantic corporation in this country, with a capital running into millions, controlled by soap and petroleum interests, to ensure a plentiful supply of paraffin wax for candle manufacture. It is understood that this corporation, which includes Lever Bros., the Burmah Oil Co., Scottish Oils, Ltd., and the Asiatic Petroleum Co., will not by any means constitute a monopoly, for it does not appear to include any American petroleum companies, the world's chief suppliers of paraffin wax hitherto, nor the big meat packing interests of Chicago, who are also largely interested in soap and candles. The Anglo-American Oil Co., in fact, announced last year that they would themselves manufacture candles which would be sold to the retail trade direct under the name of Angloco candles.

Burmah or Rangoon petroleum contains an exceptionally large percentage of paraffin wax, up to 10 per cent., as compared with 3 or 4 per cent. in American oil. The exports of paraffin wax from the U.S.A. in recent years have averaged 300,000,000 lb., large quantities coming to this country and to Italy. Italy is the world's greatest consumer of candles, enormous quantities being used in the churches, and she imports annually about 20,000 tons of paraffin wax, of which 75 per cent. comes from the U.S.A. and the remainder from this country. The output of paraffin wax from the Scottish shale oil industry formerly averaged 25,000 tons, but both this and the American supplies appear to be falling off. The important process of sweating the wax was due to a very trivial chance occurrence, namely, the accidental falling of a piece of wax on to a steam pipe.

Candle-making Machinery

The first recorded improvement upon the candle mould attributed to de Brez was made by Thomas Binns in 1801, and consisted of the alternate application of heat and cold to the mould enclosed in a tight box, the precursor of the present candle machine. This device of Binns was patented by Wm. Palmer in 1832, and a further patent on the same lines was taken out by Joseph Morgan in 1834. Morgan's machine was continuous-wicking, was provided with hollow movable pistons for expelling the moulded candles, and with some further slight improvements by Palmer in 1845 and the American, Stainthrop, in 1855, it was essentially the same as that now used. Recent patents in connection with the candle industry are for the most part very trivial. They include improved methods of packing, prevention of dropping or guttering, candle dipping, and "time" candles—*i.e.*, candles with non-inflammable discs inserted at intervals so that they burn for a specified time and then go out.

The candle wick is, of course, an important part. It is made of best quality bleached cotton, carefully spun and soaked in a solution of mineral salts and dried. The proportion of mineral matter retained is extremely small, but it very considerably improves the burning of the candle. The wick is wound on spools or bobbins on the spool-winder, and this machine is also used for braiding several wicks together when wicks of great thickness are required. The spools, when full, are inserted on the spindles of the candle-machine. The size of the wick is measured by the number of threads in a strain and the number of strains in the wick. Thus, a 3-10 wick contains three strains of ten threads each. The size of the wick in relation to the diameter of the candle and to the fusibility of the candle material is a matter of very nice adjustment.

Unit of Light.—The standard sperm candle of Great Britain and of the U.S.A. is the practical unit of illuminating power. It weighs exactly one-sixth of a pound and burns 120 grains of spermaceti per hour; but these conditions are not sufficient to determine its luminous power, which depends also on the length and shape of the wick, the height of the flame, and the composition, temperature and humidity of the atmosphere. A standard candle is also used in Germany, but the French use a lamp (the Carcel lamp) consuming 42 grammes of colza oil per hour. Photometry, or the science of light measurement, is an important branch of knowledge which has made great advances in recent years, and various improved light standards have been evolved, including Harcourt's pentane standard, the Hefner-Alteneck amyl acetate lamp, and others.

British Export Trade in Candles.—Exports of candles in 1913 amounted to 261,000 cwt.; in 1920, 240,000 cwt.; in 1921, 69,000 cwt.; in 1922, 129,000 cwt.; and in 1923, 132,000 cwt. Italy consumes the largest quantities, but the greater part of her requirements are supplied by the Italian makers. China and Japan use enormous quantities, but these are mainly supplied locally, and by one or two large English firms who have established works in the East. The same applies to India. South America is another large market for British exports, but large quantities of candles are made in Brazil from locally produced wax, as is the case in China and Japan. No candles are imported into Great Britain.

Reduction in Unemployment

THE number of persons on February 11, 1924, recorded on the Live Registers of the Employment Exchanges in Great Britain was 1,153,600. This was 58,319 less than on February 4, 1924, and 96,509 less than the figure recorded on December 31, 1923. Included in the total were 853,100 men, 37,700 boys, 225,400 women, and 37,400 girls.

No Award in the Levinstein-Green Claim

Review of the Points at Issue

THE trial of the Levinstein-Green claim for an award for the invention of "a new form of mustard gas" will long be remembered as one of the most interesting and remarkable chemical disputes of its kind. It was heard before the Royal Commission on Awards to Inventors and the claim was brought by Dr. Levinstein and Professor Green on the ground that they were the true inventors of the toxic substance produced by them for use against the German troops. The Tribunal, which consisted of a High Court judge, a K.C. long experienced in Chancery and Patent practice, and a distinguished chemist, was singularly well qualified in every sense to try such a claim. The hearing occupied six whole days—a longer period, we believe, than any similar case has occupied the Commission—and the evidence and the arguments of counsel, often wearisome in their technical detail, were heard with more than the usual degree of patience. At the end of it all the Tribunal found that the so-called Levinstein-Green process and product were completely covered by Sir William Pope's patent No. 142,857, and that, there being nothing new in either the process or the product, no award could be made to them.

The case was in many respects of so remarkable a character and has aroused so much interest in chemical circles that it may be worth while to put on record briefly the principal issues it raised.

It was not, according to their own account, the original intention of the claimants to seek a pecuniary award but merely to obtain "an acknowledgment of the great services" which they had rendered. Such an acknowledgment being, however, apparently withheld, they decided on the costly and troublesome course of claiming an award as inventors and of so extorting from the Crown what they believed to be due to them. Once embarked on that course they stated their claim in the most comprehensive and inclusive terms. Their invention, it was stated in their claim, comprised the entire "manufacture, product, process and plant of a new form of mustard gas," known as "disulphide" to distinguish it from the monosulphide produced by the Pope reaction. This new form of mustard gas, as the claimants regarded it, was said to be chemically different from the Pope product in the fact that it contained an additional atomic proportion of sulphur, either combined or in solution. The claimants admitted, however, that if their process and product were covered by the Pope patent 142,857 they could not recover before the Tribunal.

On this central question, whether the claimants' process and product were covered by the Pope patent, there was at once the clearest issue between the parties. The claim, the Crown said at once, is completely covered by the Pope specification. It was further pointed out that the contemplated product of the Pope process was actually manufactured in February, 1918, by Pope and Gibson by the absorption of ethylene in sulphur monochloride at temperatures ranging from 10° C. to 45° C., and by Chance and Hunt, at Oldbury, between April and July, 1918, at temperatures varying from 15° to 65° C.

On the other side the claimants' leading counsel was equally emphatic. "Neither my process nor my product," he said, "is covered by the Pope specification." Getting rid of the sulphur difficulty—that is, keeping it in solution instead of allowing it to deposit—he claimed to be a new step and a new process; the retention of the sulphur, he further argued, produced a chemically different product which the other side never sought and never got. On this central point the decision of the Tribunal, after an extremely patient and thorough hearing, is conclusive. They found that the product and the process mentioned in the applicants' claim were completely covered by Letters Patent No. 142,857 (the Pope specification), and that they could not recommend any remuneration to the applicants.

In the course of the hearing one very curious point was raised in relation fo the Patent. In the Pope specification there is an Example II. which provides for the passing of ethylene gas through sulphur chloride at a temperature of 30° C. and clearly shows that the Patent thus included what is called the low temperature as well as the high temperature process. This Example II., according to the claimants' case, was for "a process discovered and worked out by Professor Green and Dr. Levinstein at Blackley, which had then been in successful operation for over three months." This claim raised a curious difficulty. Obviously, if the process described in the Pope specification was the process discovered and worked out by Green and Levinstein it could not be a different process, as the applicants had claimed. On the other hand, if it were a different process, obviously it could not have been based, as the original suggestion was, on knowledge acquired at Blackley and later incorporated in Example II. This matter of Example II. was put to Dr. Levinstein in great detail in cross-examination, and he frankly admitted that his original view that Example II. was based on "knowledge acquired at Blackley" had been changed and that he now took a more charitable view of the point. It is worth recalling that Dr. Levinstein frankly withdrew the claimants' original suggestion in the box and adopted the view that Sir William Pope and his colleagues had been working on quite independent lines.

The decision shows that in the opinion of a very competent Tribunal the stuff produced was the monosulphide which the Pope reaction was designed to produce, whether containing or freed from sulphur, and not the disulphide, a new chemical compound. There is, in fact, no convincing chemical evidence for the existence of such a body as dichlorethyl disulphide and, in any case, if it was formed at all it was clearly unstable and readily dissociated at least in part to the monosulphide and sulphur. It is clear, however, that Levinstein and Green were among the first to produce the toxic product required for the troops, or something closely akin to it and equally effective, and that they alone, with the exception of the Avonmouth factory, continued regularly to produce it on a manufacturing scale in this country. Their total output amounted to about 88 tons, as compared with about 560 tons produced at Avonmouth.

Undoubtedly the idea of avoiding the separation of solid sulphur, and several other points suggested by the claimants' experience in the difficulties of large-scale chemical processes were the fundamental factors in this result. Although the transfer from small to large-scale production is admittedly difficult, to achieve it successfully does not constitute an invention. Any competent chemical engineers would probably have worked on similar lines, and, in fact, they did so, at the Avonmouth plant, at several private works, and at more than one French works. The old German process for making dichlorethyl sulphide was extremely complicated and costly, requiring about six separate operations, and the working out of the conditions for the reaction between two such simple bodies as ethylene and sulphur chloride to produce the required toxic product was really masterly. That, of course, must always stand to the credit of Sir William Pope and his co-workers, while so far as actual production is concerned the evidence made it clear that it was from the French authorities, rather than from Blackley, that Avonmouth got the advice on which it acted.

In these cases before the Commission there appears to be no award of costs, each party bearing their own expenses. As the hearing lasted six whole days the total costs of both sides cannot be far off five figures.

The "M.G.C." Manchester Year Book

A HANDY little volume, the "M.G.C." Manchester Year Book for 1924, has just made its appearance. This contains a brief record of the year's progress in the various trades more directly associated with Manchester (including chemicals and dyes), and in civic and official departments. There is a new map carried out in an old-fashioned style, showing the principal buildings, railways, roads and waterways of the city, and an important feature is a Who's Who of Manchester men. This book should be invaluable to Mancunians, and extremley useful to all whose business brings them into association with Manchester, and well worth its half-crown.

Handling of Hydrochloric Acid

Paper before the Institution of Chemical Engineers

Mr. D. M. Newitt, B.Sc., read a paper at a meeting of the Institution of Chemical Engineers in London on Monday, dealing with the Transport, Storage and Distribution of Hydrochloric Acid. The following is an abstract of the paper :—

Amongst industrial chemicals, hydrochloric acid is the most difficult to store in bulk owing to its corrosive action on all materials of which large receptacles can be constructed. The number and nature of the materials used in the manufacture of acid reaction vessels and acid pumps, together with the lack of any uniform practice in handling the acid afford sufficient evidence of the demand for improved methods.

Of those substances inert to hydrochloric acid, nearly all are brittle, and all of them are costly and by reason of their mechanical properties unsuitable for the construction of large sized vessels. Containers of small capacity can be made of an inert material protected from rough handling by some suitable form of "armouring" or large iron, steel, or wood tanks can be lined with an inert substance.

Efforts have not been wanting on the part of acid manufacturers to introduce a system of bulk handling of hydrochloric acid, and in some cases they have taken the first step in adopting tank wagon transport; but such a move calls for co-operation on the part of the consumer. The essential concomitant of transport in bulk is storage in bulk. The introduction of this system involves the provision of a storage tank with distributing mains, pumps and cocks so that the acid may be carried from the tank to the various reaction vessels without any handling.

The Storage Tank

In the selection of material and the design of the storage tank the conditions of its employment differentiating it from an ordinary storage tank must not be overlooked.

In the case of a lined iron or steel tank, for example, it is essential to have a non-porous lining, made from a material which can derive support by being firmly attached to the metal with as few joints as possible. In this connection the large coefficient of expansion of iron with rise of temperature is an important factor; for, if, as is usually the case, this coefficient is much greater than the corresponding coefficient for the lining, severe stresses will be set up in the latter, with a consequent tendency for the lining to warp away from its support and in extreme cases to crack. This indeed was the fate of many of the earlier ebonite lined steel tanks, and even with improvements in the quality of the ebonite and the methods of attaching it, such tanks are still somewhat fragile for this reason.

Mention may be made of an attempt to remedy this defect carried out by Messrs. E. I. Du Pont des Nemours and Co.* A steel tank was lined with ebonite superimposed upon soft rubber, the rubber being vulcanised to the steel. After several months service the tank was opened up and examined. Several joints in the ebonite lining were found to have given way, but the soft rubber was intact and had completely protected the steel from corrosion.

It is best to avoid the use of iron or steel if possible. The alternative as a material for large tank construction is wood. Certain varieties of wood, such as yellow pine and cypress, withstand the action of hydrochloric acid remarkably well† and may be used unprotected in tanks to contain dilute acid. For general use, however, the surface of the wood should be protected from direct contact with the acid, although the demands on the lining are less exiguous than is the case with a metal tank. For instance, such a material as asphalt, which is slightly porous and would be inadmissable in the case of iron, forms quite an efficient lining for wood.

Many designs of wood tank for acids have been patented and a number of composition linings recommended.‡ In one case a tank is constructed of two layers of wood with the enclosed space filled with a fused mixture of sand, pyrites and sulphur.

But the material best adapted for the purpose of a lining is an acid proof quality of soft rubber, and rubber lined tanks, although rarely seen in this country, are largely used in America and have earned a high reputation. It is evident that, given acid resistant properties, rubber is a material peculiarly suited to the service. Its strength and resistance minimise the danger of damage through accidental rough usage, and when used in conjunction with wood a tear in the lining may be repaired both quickly and without risk of damage to the tank. It is not suitable for use in the presence of free halogens.

The effect of heat on the rubber is influenced by the nature of the liquid in contact with it. In some cases a temperature of 130° C. may be safely used, and in most cases a temperature in the neighbourhood of 100° C. causes no ill effects. This may be contrasted with the behaviour of ebonite which softens rapidly when heated above 70° C.

In addition to the advantages of strength and durability accompanying the use of rubber and wood, the cost of an installation built up of these materials is very much less than that of any other combination that can be employed for the purpose.

The Distributing System

After describing and illustrating some typical installations, the paper points out that the choice of the shape of the tank lies between rectangular and round, with nearly all the advantages in favour of the latter. A round tank, in addition to being easier to make and erect, has all its iron supports on the outside and visible, whilst the rubber lining can be applied with only a quarter of the number of seams demanded by a rectangular construction.

Second in importance to the storage tank are the acid mains; and here again practice differs as to the choice of material for the pipes.

Ebonite, silica, glass, earthenware boiled in tar, and soft rubber have all been used. As in the case of tanks, the nature of these materials render it necessary to protect the pipes either by a suitable casing or by running the line as far as possible out of reach of accidental blows, a condition not always practicable. With the exception of the last, they are rigid and brittle, and can only be obtained in short lengths. Ebonite pipes, for instance, are not made in lengths much exceeding 10 ft.; a main 60 ft. long would thus have seven joints, and all joints are potential leak points.

Soft rubber piping, on the other hand, is made in lengths of 65 ft. and therefore very few joints are necessary, and the risk of leaks in the mains is minimised. In addition, pipes of this material may be carried round bends and corners which would require special sections in the case of rigid pipes.

Relay Tanks and Reaction Vessels

From the mains the acid is delivered to relay tanks or direct to the reaction vessels. Both must be made of or lined with acid resisting material.

The relay tank may be of similar design to the storage tank. The purpose of this tank is to permit of the acid from the mains being diluted, heated or otherwise treated before being run into the reaction vessels.

Since all chemical reactions involve energy changes, the reaction vessels have to withstand, in addition to the acid, more or less rapid fluctuations of temperature. It may also be necessary to carry out the reaction under reduced or high pressure.

This introduces new factors into the design of the tanks. The effect of heat on the material used to line the tank must be ascertained. Ebonite and asphalt for example soften and become plastic above a certain temperature, whilst stone and ceramic materials are liable to crack as the result of sudden changes in temperature or pressure.

Moreover, the mechanical wear on the lining may be considerable, due to the abrasive action of suspended solids in an agitated liquid, or to the formation of a precipitate or sediment which has to be dug out from the bottom of the tank.

For reaction vessels therefore a much stouter construction is both necessary and desirable. Rubber linings are again the most suitable, but it may be desirable in some cases to protect them from mechanical wear by an easily renewable lining of wood.

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* Industrial & Eng. Chem., Vol. 15, No. 2.

† "American Wooden Tank and Vat Practice." *Chem. Age* (*N. York*), Vol VII., No. 167, p. 270.

‡ Kramer B.P. 4684, 1895. T. D. Owen B.P., 21294, 1892.

Transport of Hydrochloric Acid

The transport in bulk is a separate and important phase of the handling of acid.

A wagon tank is called upon to encounter the mischances of travel by road and rail. It must be so designed as to withstand continual vibration and shocks, and in the event of a collision to remain intact. It has also to stand the internal pressures used in blowing the acid from the wagon to the storage tank, which may be situated a considerable height above ground level. Provision has to be made in the design for rapid cleaning and repair. A point often overlooked in the design of wagon tanks is the provision of adequate devices for rapid filling and emptying. The selection of suitable fittings will depend on the power available for pumping the acid at the various works where it has to be delivered. When compressed air of sufficient pressure is available it may be used connected direct to the wagon tank, or through the medium of an acid elevator of the automatic type. Alternatively a centrifugal pump may be more convenient. Much unnecessary delay and expense will be avoided by an agreement on the question of plant and fittings between the manufacturer and the consumer.

Comparative Costs

At the conclusion of the paper there are some interesting figures as to costs of the three methods of handling hydrochloric acid, viz. :—

Method I. By transporting, storing and distributing in carboys ;

Method II. By transporting in wagon tanks, and storing and distributing in carboys ;

Method III. By transporting in wagon tanks, storing in bulk, and distributing through pipes.

An example has been taken where the acid is purchased, weekly, in ten ton lots, and is delivered to a factory, situated 100 miles on a direct route from the acid works, and based on definite figures available, the costs of carriage are respectively, after making various allowances, £16 11s. 3d. ; £11 4s. od. ; and £9 8s. 6d., respectively.

The investment by consumer for the storage tank and distributing system is about £120, and the investment by the manufacturer for the rubber lined tank wagon is about £200.

From the total costs, however, must be deducted a very considerable rebate allowed by the acid manufacturer to consumers purchasing their acid in bulk and storing it by this method. This may be between 5 per cent. and 10 per cent. of the purchase price. It represents the increase in efficiency that accompanies a bulk method of handling. If the price of acid is taken at, say, £4 per ton the rebate, calculated on the lower percentage, amounts to £104 per annum, and is sufficient to pay for the cost of the entire installation in less than two years. An installation, such as the one described, should last for upwards of twenty years. There is, therefore, a big margin available for the reduction of cost of manufacture in processes using hydrochloric acid.

In conclusion it may be said that a method based on uniting the properties of two substances cannot be regarded as entirely satisfactory, but advantage must be taken of the best materials available until the ideal has been discovered. Possibly this will be found among the new alloys of iron ; but it is an aggravating circumstance that, so far, these alloys appear to become brittle in proportion as their resistance to acid increases ; consequently they share some of the disadvantages that are seen to accompany the use of most inert compound substances.

Another Material Suggested

An interesting discussion followed the paper. Dr. W. R. Ormandy described a storage tank he had built with blue bricks and a special cement made out of pitch and sand, which had been successful for a time, though ultimately it had blown out at the side owing to the action of hot acid. He then described a material called " Podorite " which is being produced in Switzerland. This was made of a special pitch with a high softening point, mixed with mineral matter to make a pitch concrete, which could be moulded and cast into a complex structure. As the cost was little more than ordinary cement he thought this was a material with immense possibilities. He asked a question as to whether a rubber pipe would be capable of carrying 40 per cent. acid at 100° C., or the vapour at 100° C., as if so it would be a most valuable adjunct to " Podorite."

Mr. J. Vogel commented on the present difficulties and expense in obtaining a satisfactory supply of hydrochloric acid when depending on rail transport. He confirmed the author's opinion as to satisfactory service given by rubber pipes. He personally had used wooden tanks lined with tar or bitumen for hot dilute acid, the iron straps of which were protected from the effects of the vapours by a covering of lead, which was quite satisfactory.

Dr. L. Veillon described some hydrochloric acid tank wagons in the U.S.A. which were built of wood and lined with a special hard rubber.

The Chairman reminded them that some years ago, nitric acid presented similar problems in handling, and it had been found simplest to manufacture it on the spot.

Mr. Newitt replied briefly.

Chemical Preservatives for Timber

Recently Discovered Mixtures

At a meeting of the Royal Society of Arts, on Friday, February 13, Professor H. Maxwell-Lefroy read a paper in which he dealt with various methods for preventing attack by the death-watch beetle in timber. This attack has been specially noticed in the timbers of roofs of mediæval buildings, and an outstanding case, of course, is the roof of Westminster Hall.

Dealing with the application of chemical preservatives, it was stated that in the days when the preservation of Westminster Hall was being considered, a mixture mainly of dichlorbenzene (which was a non-inflammable liquid, with good penetrating power, and a good insect killer), and in which was dissolved soap, paraffin wax and cedar-wood oil, was applied externally, but apparently it was not successful. But much work has been done since then, and particularly in two directions. Very stable and permanent soaps, which were more poisonous, had been made with metallic elements, such as barium, zinc, etc., which could also be emulsified with paraffin wax and other ingredients in water as a medium, it being cheaper to use water to the extent, say, of 80 to 85 per cent., if it would carry paraffin wax, a metal soap, and a deterrent oil. The following formula was suggested in this connection :—

Zinc, or barium oleate	3 per cent.
Cedar wood oil	3 ,, ,,
Soap	1 ,, ,,
Paraffin wax	10 ,, ,,
Water	83 ,, ,,

When applied to surfaces with a brush or spraying machine, this liquid left a film of wax, soap, and metallic oleate, invisible, not affecting colour or varnish, not dusting out, and not a human poison. Where colour was immaterial, one might use a copper oleate ; one could add a volatile poison, such as dichlorbenzene. In considering this one must remember that one could not as a rule use creosotes, tar oils, arsenic or mercury. A common recommendation was corrosive sublimate in spirit, but it was very deadly to human beings, both when applied and thereafter, and it attacked metal. A mixture used in some buildings was linseed oil and turpentine ; this was an excellent temporary local application, the turpentine driving the insect in, but beetles came freely through it when the turpentine had gone. Among the immense range of possible chemicals there was a very great variety of choice, but the author questioned whether anything that was really better than corrosive sublimate, creosote, or turpentine could be used.

Internal Treatment of Timber

In cases where internal treatment of the timber was necessary, it was suggested that one should cautiously penetrate into infested wood with a ⅜-inch auger, screw in a pipe, and pump in a liquid which would give off a poisonous vapour, penetrating the burrow systems and killing larvæ, and leave a permanent poisonous deposit against future attack and strengthen badly decayed wood. The difficulty was to choose a liquid embodying these points. As regards the first, it was now known that one could get liquids giving off vapours toxic to insects among these classes. Examples were the petrol cyclo compounds ; the benzenes ; xylol hydrocarbons ; the acetones and ketones ; the hydrogenated phenols and naphthalenes (tetralin, hexalin, etc.) ; the pyridine and quinoline groups ; the nitrobenzenes ; the cyanides dissolved in alcohol ; the carbonbisulphide group ; the volatile fractions

from wood and coal tar distillation; the chlorinated aliphatic compounds; chlorinated benzene compounds or chlornaphthalene. In answer to the question whether one could put in a liquid that could strengthen the much decayed timber and still carry a poison and disseminate a vapour, Professor Maxwell-Lefroy said the simplest suggestions were cellulose acetate, synthetic resins, fluosilicates, hard waxes and silicon-ester. In an important case a formula was being used in which acetone dissolved cellulose acetate, zinc oleate and acetone oil; this worked well in actual application; and it had also been varied by the introduction of tetralin in place of acetone oil, the tetralin not having the objectionable acrid odour of the acetone oil. It was pumped in at spots judiciously chosen where there was reason to think grubs were at work; or badly decayed wood was saturated with it to ensure complete sterilisation and to add strength.

Progress at Wembley

Publicity for the Chemical Industry

VERY good progress is being made in the Chemical Section of the British Empire Exhibition at Wembley. It will be remembered that this occupies nearly 30,000 sq. ft. in the north-east corner of the Palace of Industry, which in itself has been complete, except for internal arrangements, since November last. In the case of the chemical section these internal arrangements consist in the partition wall surrounding the whole section, the internal partition separating the scientific section, and the structures of the individual stands. The partition walls are now practically complete, and several of the stands are already taking shape, among which the striking design chosen for the Brunner-Mond stand is the most prominent at the moment. This is in an oriental style, and will be carried out in bright colours in keeping with the general scheme of the architect, Mr. Clough Williams-Ellis. A striking frieze will surround the whole of the section depicting various phases of the chemical industry, portions illustrating laboratory processes and some works operations being already in position. The design is decorative and striking, being carried out in the bold modern style, with blue and brown as the predominating colours against a yellow background. The artist responsible is Mr. Cosmo-Clark.

Inspection of the Scientific Section

On Monday a visit was paid by the Conveners of Sections in the Scientific Exhibit in order to inspect the space at their disposal. As a result the suggested layout was approved, and the plans decided upon for fitting up the exhibits. It was generally felt that though there was not as much room in the scientific section as there might have been it would be sufficient to make a most interesting exhibit. The actual space available is 2,500 square feet, and in it will be shown various scientific apparatus mainly of an historical nature, to illustrate the fundamental experimental basis of the industry. The visitors, who were under the general guidance of Mr. W. J. U. Woolcock, included Mr. J. B. Atkinson (of the Society of Dyers and Colourists); Mr. Julian Baker; Mr. T. W. Barker (Lecturer in Crystallography at Oxford); Mr. Crystal (for Dr. C. F. Cross); Dr. T. A. Henry (Wellcome Research Laboratory); Dr. Hewitt; Dr. Levinstein; Professor McBain; Dr. Page (of Rothampstead); Sir Robert Robertson; Professor Arthur Smithells, and Sir Lawrence Weaver (Director of the United Kingdom Exhibits).

"Chemistry in the XX Century"

A volume is in preparation under the title of "Chemistry in the XX Century," which will be in the nature of a companion to the exhibits in chemical science at the exhibition. This is under the general editorship of Dr. E. F. Armstrong, F.R.S., and will be published by Ernest Benn, Ltd., and it is hoped that the price will be well below the maximum of 15s., as it has been agreed that the production is to be at cost price. There is an excellent list of sectional contributors, all experts on their special subjects, and the whole work is to be written in such a style that it will be understandable by readers with a general scientific training, and thus it should be appreciated by a large section of the general public.

The sections of the book and the contributors are as follows: X-Ray Analysis, by Sir William Bragg, F.R.S.; The Structure of the Atom, by Dr. E. N. daC. Andrade; Valency Theories, by Professor Lapworth, F.R.S. (Professor of Chemistry at Manchester University); Crystallography, by Sir Henry Miers, F.R.S. (Vice-Chancellor of Manchester University), and Mr. T. V. Barker (Lecturer in Crystallography at the University of Oxford); General Physical Chemistry, by Dr. J. I. O. Masson; Spectroscopy, by Professor E. E. C. Baly, F.R.S.; Catalysis, by Dr. Hilditch; Colloids, by Dr. W. Clayton; Rare Gases, by Dr. Travers, F.R.S. (a collaborator with Sir William Ramsay); Alloys, by Professor Desch, F.R.S.; Flame, Fuel and Explosion, by Dr. Coward; General Organic Chemistry, by Professor J. F. Thorpe, F.R.S.; Alkaloids, by Professor Pyman, F.R.S., and Dr. Henry; Sugars, by Principal Irvine, F.R.S.; Terpenes, by Professor Henderson, F.R.S.; Coal Tar Colours, by Professor A. G. Green, F.R.S.; Natural Colours, by Mr. Rex Furness; Fats, by Mr. J. Allen; Biochemistry, by Dr. Plimmer; Fermentation, by Dr. Harden, F.R.S.; Agricultural Chemistry, by Sir J. Russell, F.R.S., and Dr. Page (of Rothampstead); Photographic Chemistry, by Dr. T. Slater Price (Photographic Research Association); Cellulose, by Mr. C. F. Cross, F.R.S.; Explosives, by Sir R. Robertson, F.R.S.; and Refractories, by Mr. C. W. Thomas.

Dr. Armstrong is to be highly congratulated on obtaining such a representative list of contributors to what bids fair to be a memorable work.

Popular Chemical Booklets

In addition to the above-mentioned book there is to be a series of small books written in a more popular style, so that those without any scientific training whatever can understand. This series is under the general editorship of Dr. Stephen Miall, and it is hoped to produce them for about one shilling each, with a maximum of eighteenpence. The provisional titles are as follows: Chemical Research in General; Food; Fermentation; The Heavy Chemical Industry (Alkali, Acid, Soap, etc.); Dyes; Fine Chemicals; Wood Products; Ceramics; Rare Earths; Carbonisation of Coal; Buildings; and Air and Water. It will be understood that the writers of such books require somewhat special qualifications, and some of the contributors chosen for the series are Mr. Rex Furness, Mr. T. W. Jones, Dr. de Mouilpied and Dr. Stephen Miall himself.

Removal of Colloids from Feed-Water

MR. H. W. BANNISTER (Liverpool) read a paper on the subject of the "Colloidal treatment of feed water for industrial steam generation" before the members of the Staffordshire Iron and Steel Institute on Friday, February 15. He pointed out that the best place to treat the water was outside the boiler. Most water softeners seldom softened below 5 per cent. of hardness, and this was sufficient to cause a hard scale on the boiler. In addition, few filters removed more than 75 per cent. of the deposit, and even if the water were clear some of the lime might still be there to cause scale. This was due to some of the lime being in what was known as the colloidal state. In the colloidal treatment a colloid was precipitated by passing an electric current through a solution of it. The colloid was precipitated at the wire having an electric charge opposite to that on the colloid. A substance called algor, which was used in the colloidal treatment of feed water was deposited as a jelly on the positive wire, showing it as an electric charge. In a water softening plant the soda made part of the chalk colloidal, rendering filtering ineffectual.

Treatment of Water for Industrial Purposes

A JOINT meeting of the Chemical Engineering Group with the Institution of Mechanical Engineers has been arranged on Tuesday, February 26, at 6 p.m., in the lecture theatre of the Institution, Storey's Gate, Westminster, London, S.W.1. At this meeting, a symposium on "The Treatment of Water for Industrial Purposes" will be held and contributions have been promised by the following:—Kestner Evaporator and Engineering Co., Paterson Engineering Co., Ltd., Stream Line Filter Co., United Water Softeners, Ltd., and Mr. T. P. Hilditch (Messrs. Joseph Crosfield and Sons).

The then President of the Institution of Mechanical Engineers, Mr. W. H. Patchell, M.I.M.E., M.I.E.E., will preside, supported by Mr. J. Arthur Reavell, M.I.M.E., M.I.Chem. E., Chairman of the Group. Prior to the meeting, light refreshments will be served, and all interested are cordially invited to attend.

Chemists' Dinner at Bristol

The Institute and the Society.

THE members of the Bristol and South-Western Counties sections of the Society of Chemical Industry and the Institute of Chemistry and their lady friends met at the Royal Hotel, Bristol, on Saturday, for the annual dinner, jointly held by the two bodies. Mr. M. W. Jones (chairman Bristol section of the Society of Chemical Industry) presided, and was supported by Messrs. W. J. U. Woolcock (manager of the Association of British Chemical Manufacturers), R. D. Littlefield (H.M. Alkali Inspector), G. S. W. Marlow (assistant secretary Institute of Chemistry), J. Bernard (manager Netham Chemical Works), Professors F. Francis and J. McBain (University of Bristol), Dr. T. Howard Butler, Messrs. Arthur Marsden (secretary Bristol section Society of Chemical Industry), and A. Wintle (secretary Bristol section Institute of Chemistry.)

Mr. R. D. Littlefield, proposing "The Society of Chemical Industry," said the Society was founded in 1881, and so important was it, and such a hold did it get upon those people who were engaged in the profession of chemical industry, that in 1907 its aims and interests were honoured by being incorporated in a Royal Charter. To-day they had some 5,000 members spread all over the United Kingdom and Overseas in the Dominions. The Society was now recognised as the leader in all matters affecting the interests of the industry of chemical manufacturers and of the men associated with it. Its aim was the continued progress of chemistry as an industry.

Progressive Year

Mr. W. J. U. Woolcock, responding, read a letter of regret from the President of the Society of Chemical Industry (Dr. E. F. Armstrong) at his being unable to attend. Continuing, he spoke of the progress of the Society during the past year, and said he expressed the opinion of every member of the Council when he said they were most anxious that the closest possible co-operation should obtain between the various sections of the Society and the Council itself, and they endeavoured to bring that about. Chemists had been particularly inarticulate in letting the public know what their functions were and the great achievements made in Great Britain. There was now a possibility that those of the public anxious to read something of a scientific nature would, as the result of the action of the Council, be provided for in the production of a weekly record putting in readable form some comments on the progress of chemical industry to-day. In order further to educate the public they proposed to show at the British Empire Exhibition what was behind present-day progress. Speaking of the movement for rapprochement which was taking place amongst scientific societies, he said it ought to be encouraged in every way possible. During his experience he had found that chemical manufacturers had become more and more conscious of the help the scientific staff could give, and that was a particularly helpful sign of the times. He was convinced that the work done during 1923 in co-operation with other learned bodies was greater than in any previous twelve months, and he was equally confident that there would be even greater progress during the present year.

Increased Number of Chemists

Professor J. McBain, proposing "The Institute of Chemistry," said there were many chemical organisations which were now incorporated. The Institute of Chemistry did a work which was of the greatest importance in the maintaining the professional qualifications. They were profoundly convinced that the future of civilisation lay in the practice of science, not merely in the material benefits science brought in medicine and industry, but in the moral and intelligent ideals it inculcated.

Mr. G. S. W. Marlow, replying, said it was an extraordinary thing that during the past three years the Institute roll had increased by about 1,100, yet the actual roll of chemists without appointments had only increased by just over 100. That meant to say that the profession of chemistry had absorbed nearly 1,000 members in that time, which proved that the industry was not in an unhappy position. There were also definite signs of a greater appreciation of the value of chemistry in industry. He thought some joining together of the various chemical bodies was necessary, and suggested the formation of a commonwealth or federation of chemical societies which should appoint a general chemical council to rule the destinies of chemistry as a whole. It was true the functions of the various societies differed, but the ultimate aim of all was the advancement of chemistry, and towards that ultimate aim they could surely work together.

Dr. T. Howard Butler proposed "The University of Bristol," which was responded to by Professor F. Francis.

The proceedings concluded with a short programme of music.

Oil and Colour Chemists

The Size of Particles in Pigments

AT the monthly meeting of the Oil and Colour Chemists' Association, held at the Birkbeck College, London, on Thursday, February 14, Messrs. C. A. Klein and J. Parrish read a paper on "Size of Particles with Special Reference to Pigments."

In the first part of the paper the authors were concerned mainly with the separation of particles of comparatively large size, it being the intention to study the problem in stages, dealing first with large size particles, in the hope that technique would improve by experience so as ultimately to develop in such a way as to provide a satisfactory method for the examination of the finest particles which are encountered in the paint industry. The apparatus previously described had since been altered in a number of essential particulars, chief among which were the substitution of a single elutriation vessel by four elutriators of varying diameters, arranged in series; the provision of a longer cylindrical body in the elutriators; the preliminary separation of the coarse and fine particles by use of high velocity currents, followed by subsequent re-treatment of the fine fractions at lower velocities. The advantages accruing from these changes were set out by the authors as follows: (1) The use of four elutriators in series yields cleaner separations, in addition to which four distinct fractions are simultaneously obtained, resulting in a considerable decrease in the time of operation when working at low velocities.

(2) The increased length of the cylindrical portion of the elutriator tube results in an increased length of time and space available for separation, with a result that it is possible to retain border line particles which, in the earlier apparatus, were carried over and so contaminated fractions which are now more even sized.

(3) The preliminary separation of coarse particles prevents blocking or clogging of the apparatus when using low velocities by reason of the decreased quantity of material to be treated and the absence of large particles.

Applications to the Paint Industry

After discussing the operation of the apparatus, the authors went into some detail concerning recent applications to the paint industry, and gave a short account of some of the problems which they had been considering. For instance, the bulking value of a pigment was a matter of great importance to the paint industry, but up to the present no detailed investigations appear to have been made as to the reasons for the many and varied bulking values which could be obtained with the same material. A table of figures was given showing bulking values and oil absorption of a number of pigments compared with the air voids in the packed conditions, and it was pointed out that there did not appear to be any defined relation between the air voids and oil absorption. It was, therefore, suggested, that the determination of oil absorption values might, with advantage, be discussed by the Association, because the values obtained in the laboratory, according to the authors' experience, although in many cases proportionate in value to results on the large scale, did not appear to have any direct bearing.

Loose Bulking Value of No Importance

With regard to the determination of specific gravity, the authors have been impressed by the serious difficulties which were met with here in relation to fine powders. Many workers had determined loose and packed bulking values for various pigments, but the authors are of the opinion that the loose bulking value had neither practical nor theoretical importance. Neither did they agree that the packed figure could be calculated from the loose figure, and they alleged that the formula devised by Scott for this purpose was unsound.

As to the influence of the air-surround of pigments, it was generally agreed that many pigment particles were surrounded by a layer of air which was only removed with difficulty and which, in ordinary circumstances, had a large influence on the bulking values. Probably the most notable of these was carbon black which, in the packed condition, shows air voids of 80 per cent. It would be found that the finer the pigment the more definitely did this effect make its appearance and which seemed to suggest that it was directly related to surface area. The removal of air surrounding very fine particles was not an easy matter, due, probably, to the large surface area exposed and consequent surface tension forces to be overcome.

The authors had also been studying the influence of specific surface as a factor in determining the hiding power of a pigment, but at the moment the results they had obtained were not sufficient to warrant including them in the present paper. The same remark applied to the effect of surface area on plasticity. The results of an investigation made into the relationship between size of particles, bulk, and degree of oxidation in red lead were then given. From the figures obtained the conclusion was drawn that the extent of oxidation of lead monoxide was dependent on its size, the smaller particles being more readily oxidised, this being accompanied by a decrease in bulking volume and an increased oil absorption.

Discussion

Dr. Fox said there was one possible method of dealing with the size of particles, and which was perhaps academic—*i.e.*, if we could get the material in any sort of transparent medium that would hold it up and let it fall at a rate at which Stokes' law would apply, and then used a nephelometric method, the degree to which that scattered light was polarised did give a measure, more or less, of the shape of the particle, and, to an extent, of the size. That had been worked out in a very complicated mathematical paper by Mie, in about 1905, but the final results were striking. Mie had shown that the smaller the particle, and the nearer it approached the spherical condition, the greater the degree of polarisation of the scattered light, and it was just on the cards that by a simple apparatus which could be devised we might, choosing a medium like glycerin, be able to get to the over-all size of the particle, and possibly, to an extent, of its shape, provided it was not too irregular.

Mr. Koekkoek said that in their results the authors had included certain lake pigments such as vermilionette, and he asked if any, and if so what, allowances were made for the solvent action on the pigments when treating them with alcohol. Also, was the capacity of the pigment exactly related to the fineness, because many examples could be given where the coarser materials were more opaque than the fine.

Mr. Parrish, in replying as to the solvent action on lakes, said the vermilionette was the only one of that nature that he had tackled. There was a certain amount of solvent action, but not sufficient to warrant altering the method in that particular case.

Sols and Gels of Agar-Agar

The Faraday Society met in London on Monday, when a paper was read on "Certain Physical Differences Between Sols and Gels of Agar-Agar," by Dr. E. Hatschek and Mr. R. H. Humphrey. The authors showed that agar sols and gels containing 3 per cent. and more of agar show marked optical differences, inasmuch as the sols are clear in transmitted and reflected light, while the gels, though clear in transmitted light show marked opalescence in reflected light. Owing to the lateral scattering of light, the gels also appear darker in transmitted light than the corresponding sols. The opalescence does not decrease when the gels are kept for several days at a temperature of 62° C., *i.e.*, about midway between the setting and melting point. The conductivity of agar gels containing electrolyte is greater, for both direct and alternating current, than that of the corresponding sols, the difference increasing with increasing concentration of agar. The conductivity of agar sols and gels containing electrolyte is greater for alternating current than for direct current, the difference being slightly greater than that between the alternating and direct current conductivities of aqueous electrolyte solution of the same concentration without agar.

Other papers presented were on "The Influence of Anions on Coagulation of a Negative Colloidal Sol," by D. C. Henry and V. A. Morden, and "The Diffusion Potentials and Ionic Mobilities of Benzoates and Salicylates, and their Modification by a Membrane of Parchment Paper," by E. B. R. Prideaux and W. E. Crookes.

Germany and Our Dyes

To the Editor of The Chemical Age.

Sir,—In justice to our dyestuffs industry it is only fair that certain facts should be made known regarding the discussions now being carried on between the German dyemakers and the British Dyestuffs Corporation, Ltd. There appears to be a widespread belief that approaches were first made from Great Britain, whereas the facts are precisely the other way about.

It was after an invitation sent through a diplomatic channel to this country from Germany that the first meeting took place in Paris just before Christmas, 1921. The chief German representative at this conference was Herr Carl von Weinberg, chairman of the German Cartel's central committee, who then discussed with Sir William Alexander, chairman of the British Dyestuffs Corporation, Ltd., the new situation which had clearly arisen from our success in meeting out of our own resources the dyes demanded during the textile boom that followed the Armistice.

From that day, three years ago, until now, Sir William Alexander has met the German advances with a characteristic clearness of head. Together with Lord Ashfield and a permanent official from the Board of Trade he attended the next discussion, which took place in Berlin during March, 1922, and both then and subsequently he has been firm in insisting that never again must this country be in a position of dependence upon others, as it was in 1914, not for dyestuffs only but for those derivatives from them which are essential to modern warfare. Since those earlier negotiations the prestige of British dyes has improved to such a point that all save men blind with bias agree that any dyestuffs "surrender" has been on the German side. Are not these German overtures, in fact, the prettiest imaginable compliment to the position won by British dyemakers?—Yours, etc.,

Harry Brittain.

House of Commons.
February 18, 1924.

Society of Dyers and Colourists.

Professor Thorpe on "Staining and Dyeing"

At a meeting of the London Section on Thursday, February 14, Professor Thorpe, F.R.S., read a paper on "Staining and Dyeing." He said that the art of dyeing was cradled in antiquity; not only were garments coloured, but in some cases the actual skin was painted with vegetable pigment. Chief among these were purple and indigo. Purple resulting from the extraction of crushed shell-fish was the first of the "vat" series. The dyeing liquor was colourless, but when goods after immersion were exposed to air they developed to a deep purple. Indigo obtained from the plant was used in a similar manner in India for many centuries. When either dyestuff was precipitated from a solution in consequence of the fact that there was no known method for redissolving it, the colour had to be employed as a pigment. Other colours used—those of the mordant class—including madder (alizarine) and logwood, were forerunners of a great class, and any colour which could not be rendered fast by some treatment was rejected as worthless.

The discovery of mauve by Perkin in 1856 not only gave us a new type of dyestuff but also a new method of dyeing, or rather staining. This, a basic colour, dissociated readily in solution and the liberated base stained wool, in which it was soluble, but not cotton. In the application of acid dyestuffs the free sulphonic acid base, liberated from its sodium salts by means of dilute mineral acids, coloured wool without staining cotton. At a later date Böttiger discovered that congo red—a sulphonic acid derivative of benzidine—possessed the power of staining cotton, but it was most efficient when employed in alkaline solution. This is due to the fact that dyestuff is soluble in cellulose—a physical phenomenon—and not to the fact that it is a benzidine derivative.

The method of colouring with acid, basic, and direct colours was really staining, since the dye was only dissolved in the fibre. True dyeing only occurred when the dyestuff was

formed in the fibre and was incapable of emerging therefrom. Stains could sometimes be rendered fast by after-treatment; thus some direct colours could be made fast by the action of metallic salts, some by diazotising and coupling and some by formaldehyde. However, the range of true dyestuffs (vat, mordant and sulphur) was so comprehensive that no dyer can plead lack of variety for the reason for using other colours. This fact the consumer should know, and he should insist on the use of dyestuffs certified by an arbitrary authority as fast.

Claim on Dye Company's Directors

Proceedings for Recovery of £25,000 Overdraft

THE hearing was continued on Thursday, February 14 and succeeding days into this week, before Mr. Justice Horridge and a special jury in the King's Bench Division of the £25,000 claim by the London Joint City and Midland Bank, in which the defendants are the executors of the late Lord Shrewsbury (Mr. Llewellyn Wynn McLeod and Mr. C. Gardner) and Sir Henry Busby Bird (see THE CHEMICAL AGE, February 16, p. 169).

The late Lord Shrewsbury and Sir Henry Bird are alleged to have signed the guarantee in respect of the overdraft of the Aniline Dye and Chemical Company (now wound up), which carried on business in Manchester, the company's account being at the Stretford Road branch.

The defence was that the late Lord Shrewsbury and Sir Henry Bird signed the document on the representation of a fellow-director, Mr. James Gibson, of Manchester, that the signatures were only required as specimens for bank purposes. Mr. Gibson was also a defendant in the action when it started, but judgment has been signed against him in default of defence.

After the evidence of Mr. Thomas Pollitt, manager of the Stretford Road branch of the bank, as to the existence of the overdraft, Miss A. M. M. Robinson, who had been secretary to the Aniline Dye Co., was called. She described a meeting of the directors of the company on November 4, 1920, when the minutes of the previous meeting of October 21 were read. One of them stated that, the old directors having resigned and withdrawn the guarantee which they had given to the plaintiff bank for an overdraft, a fresh guarantee had been given by the new directors, including Lord Shrewsbury and Sir Henry Bird. Both those persons heard that minute read, and Lord Shrewsbury signed the minute book. Pressed as to the whereabouts of Mr. Gibson, she said he was a boarder in her house.

After further evidence, the case for the plaintiffs was concluded on Friday.

Case for the Executors

Opening the defence of Lord Shrewsbury's executors, Mr. Hawke, K.C., said the only question was whether Lord Shrewsbury attached his signature to the document of guarantee knowing that he was signing a guarantee, or did he do it because he was tricked into it by Mr. Gibson? His case was that Mr. Gibson swindled Lord Shrewsbury and Sir Henry Bird into signing the document, and that they signed it because they were told their signatures were needed for bank purposes. Gibson had not come to court because he was afraid to face the music.

Sir Henry Bird, giving evidence, stated that he invested £5,000, and Lord Shrewsbury £45,000, in the Aniline Co., the whole of which was lost. In October, 1920, a meeting of the directors was held, at the end of which, just as Lord Shrewsbury was preparing to leave, Mr. Gibson said, "There is one other matter." He produced a paper, and said he would want their signatures to it, as the bank would require the signatures of the three directors who would be signing cheques. The paper, as it lay on the table folded, appeared to be practically plain. Witness signed it, and Lord Shrewsbury and Gibson did the same. Not a word was said about the document being a guarantee, and witness believed he was merely giving a specimen signature.

At a later meeting of the directors Lord Shrewsbury took witness into another room and said, "Do you know what we signed the other day? It turns out to be a guarantee for a bank overdraft." Lord Shrewsbury added, "Don't be alarmed, because the bank have got the title deeds, which are valued at about £60,000, so you will never be called upon for any money." On the faith of that statement witness did not communicate with the bank, and he did not know at that time that he could repudiate a signature obtained in the way he had described.

Cross-examined by Mr. Stuart Bevan, K.C., Sir Henry said he had had considerable business experience.

On Tuesday the evidence was concluded for the defendants. Mrs. Brownlee, the third signatory to the guarantee, was absent, but evidence taken from a previous trial was read. This was to the effect that in signing she was under the impression that the paper was for a specimen signature only.

On Wednesday, after the jury had answered questions left to them, the case was adjourned until a day to be fixed for argument as to the effect of the alleged guarantee. The replies given by the jury were to the effect that the defendants had known that the document they had signed was a guarantee, and that they had continued to allow the bank to remain in the position of supposing that they had made the guarantee.

Proposed Dyestuffs' Combine

Deputation by the British Chemical and Dyestuffs Traders' Association

A DEPUTATION from the British Chemical and Dyestuffs Traders' Association waited on the Board of Trade on Thursday, February 14, and were informed that the agreement between the British Dyestuffs Corporation and the German dye-makers is not yet completed. Apparently, states a correspondent of *The Yorkshire Post*, the draft of the terms as arranged between the two bodies has failed to secure the approval of the Board of Trade. This at least is the construction put upon the remarks of Sir Sidney Chapman, the Permanent Secretary of the Board, who told the deputation that the agreement at the moment is in too nebulous a form to permit of any information being given concerning it. He added a warning that the forecast of the terms which had appeared in some newspapers must not be assumed to be correct. He invited the deputation to consult with the members of their Association, and, "putting the worst construction possible" on the proposed agreement, to submit suggestions as to the methods by which the interests of merchants could be safeguarded.

This invitation is a little curious, seeing that the suggestions are to be based on the assumption that the agreement, as understood by the Association, is really intended in effect to invest the British Dyestuffs Corporation with a complete monopoly for the import and distribution of foreign dyes—an assumption against which the deputation had been warned. There is, however, every disposition on the part of the deputation to comply with the invitation, and a circular will be issued at once to the members of the Association in order that their views may be ascertained and their suggestions collated. When this has been done, the deputation will again request Sir Sidney Chapman to receive them.

The chief contention put forward by the deputation was that if the agreement were based on the Dyestuffs (Import Regulations) Act of 1921, it would give to the British Dyestuffs Corporation the sole right to the importation and sale of German dyes in this country, and thereby deprive many of the members of the Association of their business as merchants and agents for German dye-makers. This Act will not expire until 1931. Were the market unrestricted, objections to the agreement would not apply, but while the national need for building up a great dye-making industry in this country is fully recognised, the deputation argued that this should not be done to the detriment of those already engaged in merchanting foreign dyes, and to the possible detriment also of the users of dyestuffs.

The deputation headed by Mr. Victor Blagden (chairman of the Association), included delegates from Manchester, Bradford, and London, and Mr. O. F. C. Bromfield, the secretary.

Reduction of Insulin Prices.

OWING to the progressive improvements they have made in the manufacture of Insulin, Burroughs, Wellcome and Co., announce that the price of the 100 unit phial of "Wellcome" brand Insulin will be reduced from 12s. 6d. to 6s. 8d. (that is, 8d. per dose of 10 units) on and from February 25. Hospitals will be supplied at a still lower rate.

Chemical Matters in Parliament

White Lead in Paint

MR. SHAW, Minister of Labour (House of Commons, February 14) replying to a question by Mr. G. White, asking if the difficulties which prevented the ratification of the Convention on the use of white lead in paint had been removed, and if it was the intention of the Government to agree to the ratification of this Convention, said: The question is under consideration by H.M. Government and the decision will be announced as soon as practicable.

Microscopic Work (Imported Stains)

Mr. Graham (House of Commons, February 14), replying to a question by Mr. Keens, asking the President of the Board of Trade if he was aware that certain stains used in microscopic work in the research departments of various hospitals, and other laboratories, and which had necessarily to be imported from Germany, were in some cases rendered useless by the Department of Customs and Excise, who opened certain of these bottles for the purpose of ascertaining the alcoholic content, said: When stains used in microscopic work are imported, the Department of Customs and Excise open the smallest possible number of bottles for the purpose of ascertaining the alcohol content. But the bottles may be delivered without being opened, provided the importer indicates in the Customs entry that the strength of the stains is not to be tested and pays spirit duty at the rate appropriate to preparations containing spirits and not tested as to alcoholic strength.

The Dyestuffs Agreement

Mr. Webb, President of the Board of Trade (House of Commons, February 15), replying to a question by Mr. Turner respecting a working arrangement or agreement with Germany, relative to dyes and dye-making, said: Proposals for an arrangement have been for some time under discussion between the British Dyestuffs' Corporation and the Interessen-Gemeinschaft, and it is understood that they are still continuing. The Board of Trade are not a party to these negotiations; and as, so far as the Board are aware, the discussions have not yet terminated, no conclusions have been laid before the Board. If a draft agreement is eventually put forward it will require the serious consideration of the Government, and I will consider the question of making a statement to the House without delay.

Sulphate of Ammonia Supplies

Mr. F. Martin (House of Commons, February 18), asked the Minister of Agriculture whether he was aware that during the spring months of last year farmers in this country had difficulty in obtaining supplies of sulphate of ammonia, and that large quantities of this fertiliser are exported from this country; and whether he would take steps to ensure that a sufficient amount of the material is retained in this country and is made available to British agriculturalists during seed time this year.

Mr. Buxton: I am aware that in some districts the supply of sulphate of ammonia for immediate delivery in the spring of last year was not large. I am advised that the supplies available this year will be sufficient, but the matter will be kept under observation.

Industrial Alcohol

Mr. Alexander (House of Commons, February 18), replying to a question by Mr. Hardie, whether, in view of the lack of control in prices and supply of petrol, he would at once begin the manufacture of industrial alcohol at Gretna Works, said: The answer is in the negative. The Board of Trade are not in a position to undertake work of this kind, but, as my hon. friend was informed on February 12, the Government is taking a leading part in the research which is taking place on this subject.

Proposed Dyestuffs Combine

Mr. J. O'Neill (House of Commons, February 18) asked the President of the Board of Trade if he would leave the question of ratification of the proposed agreement between the British Dyestuffs Corporation and the Interessen-Gemeinschaft in Germany to a free vote of the House. Mr. Alexander, in replying, referred the hon. Member to the answer on this subject which the President of the Board of Trade gave on February 15.

On Tuesday, February 19, further questions were asked by Mr. Graham White and Mr. Finney as to whether the Board of Trade would make any announcement on the matter and state the terms of the agreement. Mr. Sidney Webb replied that, though many of these questions related to a period of which he had no official knowledge, as soon as anything was officially before the Board of Trade, he would make a statement.

Dismissal of Research Chemists

Mr. Waddington (House of Commons, February 19) asked the President of the Board of Trade if he was aware that the British Dyestuffs Corporation had dismissed a large number of chemists and laboratory assistants, to the serious injury of chemical research in this country; that the corporation had hitherto refused to appoint to the directorate persons with technical and scientific knowledge of dyestuffs manufacture; and if he would take steps to provide that the Government nominees to the directorate should be persons possessing these qualifications?

Mr. Webb: I am informed that the appointments of a limited number of research chemists have been terminated within the past three months in connection with a reorganisation of the research work of the corporation. As regards the second part of the question, I understand that an invitation to join the Board of the corporation is now under consideration by a distinguished scientist. The suggestion made by the hon Member in the last part of the question will be borne in mind.

Scottish Shale Oil Works

In reply to a question by Mr. Clark (House of Commons, February 19), Mr. Webb said that there had not been any exceptional discharges recently from the Scottish Shale Oil Works.

British Phosphate Commission

Sir William Mitchell-Thomson (House of Commons, February 19) asked the Chancellor of the Exchequer whether the accounts and balance sheet of the British Phosphate Commission had been or would be presented to Parliament? The reply was that the accounts of the British Phosphate Commission would be included in the annual volume of Trading Accounts of Government Departments.

Sir W. Mitchell-Thomson asked if it was realised that in that estimate he was asking the taxpayer to put up another £100,000 for the adventure; and inquired if they could not have the accounts before they were asked to deal with them.

Mr. Snowden stated that if possible it would be done.

Case Brought by the British Oxygen Co.

IN the Chancery Division, on Thursday and Friday, February 14 and 15, Mr. Justice Tomlin tried an action by the British Oxygen, Ltd., of Upper Edmonton, against the Maine Lighting Co., of A. Side, Newcastle-upon-Tyne, for an injunction to restrain infringement of a patent for an invention relating to an acetylene oxygen metal-cutting blow-pipe. The defendants denied infringement and also the validity of the patent.

Mr. Whitehead, K.C., for the plaintiffs, said the invention was entirely novel at the date of the patent (1910). Over 20,000 of this particular metal-cutting blow-pipe apparatus had been sold. The particular advantages of the device lay in the fact that it could be easily handled and it had proved serviceable in repairing all kinds of metal bodies. The infringement alleged was limited to a metal-cutting blow-pipe apparatus, which had as an essential feature a lever operating a valve for controlling the supply of oxygen to the nozzle of the apparatus for cutting. It was stated in evidence that the number of these cutters sold was approximately 23,000 and the average price was £6.

Mr. J. Hunter Gray, K.C., opening the defendants' case, submitted that the patent was wholly void of invention, and there was no subject matter over what was known before. The prior documents which the defendants relied on showed examples of what was in fact common knowledge so far as anything was relevant to the plaintiffs' specification. This invention was the same as was applied to different tools. All they had was a valve placed in some suitable position to do a particular work, and if they were minded to alter the relative position of the valve they adjusted it by means of a screw.

After hearing evidence for the defence his Lordship reserved judgment.

From Week to Week

A NEW 100-TON MACHINE for testing the strength of materials has been erected in the Council House of the Birmingham Gas Department.

THE DEPARTMENT OF BIO-CHEMISTRY at the University of Oxford has been offered £75,000 by the Rockefeller Foundation for development purposes.

THE DEATH TOOK PLACE on Friday, February 15, of Mr. William Anderson Turner, managing director of W. T. Owbridge, Ltd., manufacturing chemists, Hull.

IN SUCCESSION to Dr. J. B. Cohen, who is retiring from the Chair of Organic Chemistry at Leeds University, Dr. Christopher K. Ingold has been appointed.

DR. W. F. BARKER, assistant to the professor of inorganic chemistry at Liverpool, has been appointed lecturer in chemistry at Cape Town University.

MR. N. J. T. M. NEEDHAM, B.A., of Gonville and Caius College, Cambridge, has been re-elected to the Benn W. Levy Research Studentship in Bio-chemistry for one year.

DR. THEORDOR CURTIUS, who was to have retired from the position of Director of the Chemical Laboratories at Hamburg University this winter, will continue in office another year.

A DECREE was passed at Oxford on Tuesday, empowering the addition of 9 acres from the University Parks for the devlopment of the scientific departments of the University.

DR. ADOLPH WINTER, in recognition of his services to the coal-tar dye industry in Germany, is to receive the honorary degree of doctor of engineering from the Technical School at Darmstadt.

THE BRADFORD DYERS' ASSOCIATION made their annual contributions to charitable institutions on Monday. These include £10 to the Royal Alexandra Infirmary, Paisley, and £7 10s to the Paisley Convalescent Home, West Kilbride.

PROFESSOR HELE SHAW, at a meeting of the Aldwych Club, London, on Tuesday, demonstrated the Stream Line filter by filtering beer. A new development of this filter, which will secure solid matter from the liquid, is announced to have recently been patented.

THE NEW HEAD of the chemical and metallurgical department of Wolverhampton Technical School is Mr. William Regan, lecturer and demonstrator at the department of metallurgy, Royal Technical College, Glasgow. He succeeds Dr. T. J. Murray, new principal of Smethwick Technical School.

MR. WILLIAM REGAN, lecturer and demonstrator at the department of metallurgy, Royal Technical College, Glasgow, has been appointed head of the chemical and metallurgical department of Wolverhampton Technical School, in succession to Dr. T. J. Murray, new principal of Smethwick Technical School.

MR. H. W. BANNISTER, of Liverpool, in a paper read before the Staffordshire Iron and Steel Institute at Dudley, on Friday, February 15, emphasised certain points in connection with the colloidal treatment of feed water for industrial steam generation. He said that the best place to treat the water was outside the boiler, so that all the deposit would take place outside it.

A LIST OF DYE STOCKS has just been issued by E. G. Sawyer and Co., "Dominion House," 110, Fenchurch Street, London, E.C.3. The list is beautifully produced in the form of a booklet, and contains acid, wool, direct cotton, basic, chrome and mordant, vat, sulphur, lake, and miscellaneous colours, classified according to shade under each heading, and with the manufacturer's name clearly indicated.

THE ADVANTAGES CLAIMED for the new method of making insulin now on trial at the Middlesex Hospital include the substitution of water for the large quantity of alcohol required in the present process, and a reduction in the total time of preparation from eight to two days. The method has been discovered by Dr. E. C. Dodds, chemical pathologist at the hospital. The clinical tests of the new insulin have proved satisfactory.

THE MEMBERS of the North of England Institute of Mining and Mechanical Engineers in Newcastle, held a meeting on Saturday, February 16, when a discussion took place on a paper previously read by Mr. E. H. Oliver on "The Economic Aspect of Winning Coal Without the Aid of Explosives." Mr. C. Norman Kemp, B.Sc., read a paper on "The X-Ray Analysis of Coal with Scientific and Technical Applications." He said that this method of investigating coal seemed to promise rich results.

A WARNING to all factory owners has been sent out by the Pharmaceutical Society pointing out that the first-aid cabinets required in all works and factories under the Workmen's Compensation Act should contain certain eye-drops, and that they may not do so if the cabinets have been obtained from other than legally registered druggists, as the drops contain a scheduled poison. It is recommended that if there is an omission it should be rectified immediately as factory owners or occupiers are liable to penalties under the new Act for not having the prescribed equipment.

FAILING to keep certain machinery properly protected was the cause of a summons brought against Typke and King, Ltd., the Crown Chemical Works, Mitcham, at the Croydon County Police Court. One of the employees who was repairing a vat came in contact with a revolving shaft and was injured. The defendants stated that they had been in business as chemical manufacturers since 1885, and that was the first accident that had taken place at the factory, and the first complaint they had received against the works or machinery. The defect had now been remedied. A penalty of £5, with costs, was imposed.

AT A MEETING of the West of Scotland Iron and Steel Institute on Friday, February 16, at the Royal Technical College, Glasgow, Dr. J. Newton Friend, of Birmingham, read a paper on "Recent Advances in the Study of Corrosion." He said that any satisfactory theory of corrosion must be capable of explaining that iron does not rust in dry air; that iron does not rust in pure water; that iron does not rust in moist air at a constant temperature, and that iron does not rust in steam. Dr. Newton Friend then dealt with theories which have been offered to account for corrosion, and with experiments showing the effects of corrosion on iron under different circumstances.

THE ADVANTAGES of publicity clubs to business men in improving the value of their advertising methods are well brought out in a booklet just issued by the Publicity Club of London. There are so many specialists now concerned with advertising —the newspaper man, the colour printer, circular letter writer, etc.—that mutual contact with the business man is essential for good advertising, and this can be secured most happily through a publicity club. In addition, such a club is a great incentive to honest methods in advertising. Copies of the booklet will be sent to readers who forward a 1½d. stamp for postage to the Hon. Press and Development Secretary, Mr. W. T. Day, 11, Arundel Street, Strand, London, W.C.2.

IN PREVIOUS YEARS the British Industries Fair has been held in February, but this year, to meet the convenience of the many buyers who will be attending the opening weeks of the British Empire Exhibition, it has been decided to hold it in London, from April 28 to May 9, and at Castle Bromwich Aerodrome, Birmingham, from May 12 to 23. As a result, it is expected that the number of buyers visiting the Fair will be far ahead of past years. A quarter of a million invitations are annually issued by the organisers, the Department of Overseas Trade. Of these a considerable quantity have already been issued to buyers in the more distant parts of the world. Of the acknowledgments so far received over 60 per cent. state that the writers have definitely arranged to attend.

MR. CHASTON CHAPMAN, president of the Institute of Chemistry, paid a visit to Birmingham on Wednesday, February 13, and addressed the members of the Birmingham and Midland, and Bristol and South-Western Sections. Speaking on the subject of factors which make for success in chemical practice, Mr. Chapman urged the necessity for a student to be really keen on his work. Chemistry, like all the great professions, made heavy demands upon its followers, and a young man must be prepared to put in long hours of labour. He strongly discouraged too early specialisation. Industry, close attention to detail, honesty in work, and a resolve to understand the reason for every operation he undertook, were all important factors making for success in the chemical profession.

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CATALYSIS.—Catalysis of homogeneous gas reactions. Part II. Catalysis of nitrosyl chloride formation by nitrogen dioxide. A. Kiss. *Rec. Trav. Chim. des Pays-Bas*, January 15, 1924, pp. 68–79.

COMBUSTION.—On the influence of some non-inflammable vapours of organic liquids on the limits of inflammability of methane-air mixtures. W. P. Jorissen and J. Velisek. *Rec. Trav. Chim. des Pays-Bas*, January 15, 1924, pp. 80–86.

ASPHALT.—The constitution of asphalt. F. J. Nellensteyn. *Chem. Weekblad*, January 26, 1924, pp. 42–51.

Patent Literature

Abstracts of Complete Specifications

208,155. CHLORINATING BENZENE, PROCESS FOR. Farbwerke vorm. Meister, Lucius Bruning, Hocehst-on-Main, Germany. International Convention date, December 5, 1922.

Benzene vapour, oxygen, and the vapour of commercial hydrochloric acid are passed through a tube of acid-proof material containing a copper chloride catalyst on pumice. The tube is heated to 400° C. and the products condensed, washed with alkali, and fractionally distilled to separate the chlorbenzene. The main product is monochlorbenzene.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—187,601 (F. L. Smidth and Co.) relating to a process for the agglomeration of ore, see vol. vii, p. 943 ; 191,005 (Farbwerke vorm. Meister, Lucius, and Brüning) relating to the absorption of gases or vapours in charcoal, see vol. viii, p. 215 ; 192,040 (W. C. White) relating to the low-temperature carbonisation of solid fuels, see vol. viii, p. 317 ; 199,025 (C. Urfer) relating to a pulverulent catalyst for the synthesis of ammonia, see vol. ix, p. 180.

209,480 and 210,033. TITANIUM COMPOUNDS. C. Weizmann and J. Blumenfeld, 16, Addison Crescent, London, W.14. Application date, July 12, 1922.

209,480. The object is to obtain crystalline titanyl sulphate and a crystalloid solution of titanyl sulphate from titanium oxide by crystallisation. It is known that when titanium oxide is treated with sulphuric acid the titanium compound is obtained in various forms—*i.e.*, in mechanical suspension, in colloidal solution, and crystalloid solution. These products are not stable, and have varying filtering qualities, stability when diluted, and behaviour when heated. In this invention, a stable crystalloid solution of titanium is obtained by treating titanium oxide with sulphuric acid in excess of molecular proportions at a temperature of 60°–120° C., which converts it partly into a crystalline salt insoluble in the excess of acid. The crystals are separated and washed with dilute sulphuric acid, and then dissolved in water yielding a crystalloid solution of titanyl sulphate. The solution is much more stable than the colloidal solution when diluted with water or other reagent, and in the manufacture of titanium oxide on a large scale it is possible to obtain products of the same physical properties when hydrolysed under the same conditions. The composition of the crystalline product is $TiOSO_4 2H_2O$.

210,033. The crystalloid solutions of titanyl sulphate referred to in Specification No. 209,480 (above) are obtained directly from titaniferous materials by treating with sulphuric acid in the proportion of 1·2–1·8 parts of sulphuric aicd to 1 part of TiO_2. The concentration is such that the boiling point is kept above 130° C., and the actual temperature is maintained below the boiling point and rising with it. This temperature should vary between 120° C. and 140° C., but it may be increased to 250° C. The product is a paste which gradually stiffens, and when treated with water gives a crystalloid solution which is practically free from colloidal titanium compounds. The solution should contain 150–250 grams of TiO_2 per litre.

209,849. CELLULOSE ESTERS, TREATMENT OF—FOR DYEING. J. Y. Johnson, London. From Badische Anilin and Soda-Fabrik, Ludwigshafen-on-Rhine, Germany. Application dates, October 21, 1922, and June 25, 1923.

The affinity of cellulose products such as acetate silk for dyestuffs is increased by treating them with alkaline saponifying agents in the presence of soluble aldehydes or oxy-aldehydes, or substances containing them in a loosely combined state. The aldehydes may be replaced by aromatic sulphonic or carboxylic acids or their salts such as cresol-sulphonic acids, naphthalene sulphonic acids, naphthol carboxylic acids, etc. The affinity for the dyestuff varies with the quantity of these additions used, so that the depth of shade produced may be varied. In an example, cellulose acetate silk is treated at about 60° C. with baryta water containing formaldehyde. The material is then rinsed and dyed. Other detailed examples are given in which the formaldehyde is replaced by acetaldehyde, glucose, glyoxal sulphate, glyoxalic acid, formaldehyde bisulphite, acetaldehyde bisulphite, formaldehyde sodium sulphoxylate, the calcium salt of the condensation product of naphthalene-sulphonic acid and formaldehyde, and the corresponding product of cresol sulphonic acid. An example is also given of the dyeing of a mixed fabric of cotton and cellulose acetate silk with a black dye which is absorbed by the cotton only.

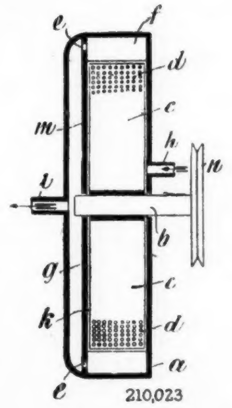
209,885 and 209,887. YELLOW COLOURING MATTER OF THE PYRAZOLONE SERIES. L. B. Holliday and Co., Ltd., and A. Clayton, Deighton Chemical Works, Huddersfield. Application date, November 17, 1922.

209,885. A dyestuff which gives yellow shades on wool is produced by combining the phenyl hydrazone obtained from dioxy tartaric acid and phenyl hydrazine-para-sulphonic acid with 2 : 5-dichlor-phenyl hydrazine-para-sulphonic acid. The phenyl hydrazone is obtained by treating a solution of 40 parts of sodium dioxytartrate in 200 parts of water and 70 parts of 30 per cent. hydrochloric acid with 27·4 parts of phenyl-hydrazine-parasulphonic acid 100 per cent. in 200 parts of water and 5·6 parts of caustic soda, which yields a yellow crystalline precipitate of phenyl hydrazone. The dyestuff is probably a mixture of tetrazine, tetrachlor-tartrazine, 1-ortho-metadichlor-parasulphophenyl-3-carboxy-4-parasulphophenyl-hydrazono-5-pyrazolone, and 1-parasulphophenyl-3-carboxy-4-ortho - metadichlor - parasulphophenyl - hydrazono-5-pyrazolone.

209,887. A yellow dyestuff containing the same products mentioned in 209,885 but in different proportions, is obtained by combining the hydrazone from 2 : 5-dichlorphenyl-hydrazine-parasulphonic acid and sodium dioxy-tartrate with phenyl-hydrazine-parasulphonic acid.

210,023. CENTRIFUGAL MACHINE FOR THE PRODUCTION OF EMULSIONS, COLLOIDAL SOLUTIONS AND THE LIKE. T. F. Westenholz, 32, Carolinevej Hellerup, Copenhagen ; and J. E. Nyrop, 18, Upsalagade, Copenhagen. Application date, July 17, 1923.

The apparatus comprises a cylindrical casing *a* containing a number of rotating vanes *c* mounted on a shaft *b*, the outer ends of the vanes being perforated at *d*. Short radial walls *f* project inwards from the casing *a*, leaving a small clearance between their inner ends and the outer ends of the vanes *c*



210,023

The sides of the vanes *c* are closely bounded by the transverse walls of the casing, and the chamber thus formed communicates by openings *e* with an adjacent discharge chamber having an axial outlet. The substance to be emulsified is forced radially outwards by the vanes and becomes compressed, while it is also forced through the openings *d*. The openings *e* are adjustable in size, so that the rate of discharge may be varied. Several such centrifugal machines may be placed in series to obtain an increased effect. The vanes may be curved as shown.

210,006. DYESTUFFS OF INDIGO TINT, MANUFACTURE OF. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, March 30, 1923. Addition to 199,360.

Specification No. 199,360 (see THE CHEMICAL AGE, Vol. IX, p. 211), describes the manufacture of dyestuffs derived from carbazole by sulphurizing the leuco derivative of the product of condensation of nitroso-phenol with carbazole in the presence of benzidine. In this invention, the sulphurisation of the leuco derivative is effected in the presence also of a mono or polyvalent phenol of the benzene or naphthalene series which acts as a flux. In an example, the indophenol obtained by condensing one molecular proportion of nitroso-phenol and one molecular proportion of carbazole is added to a fused mixture of sodium sulphide, sulphur, and benzidine, and stirred until the indophenol is reduced. The mixture is dried in vacuo, powdered, mixed with phenol and heated to 180° C. to expel hydrogen sulphide. The product is powdered and treated with sodium sulphide solution to extract sulphur and the dyestuff is filtered and dried. α-naphthol, β-naphthol, resorcinol, etc., may be substituted for the phenol.

International Specifications not yet Accepted

208,151. ORGANO-METALLIC COMOPUNDS. A. Albert, 46, Elisabethstrasse, München, Germany. International Convention date, December 5, 1922. Addition to 206,507.

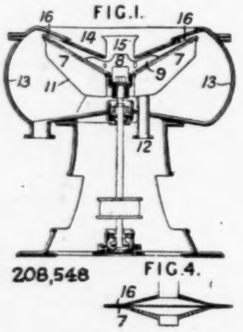
In specification 200,507, mixed aliphatic-aromatic compounds containing a carbonyl group in the aliphatic portion are mercurized, and in this invention the compounds treated contain also arsenic, antimony, mercury, iodine, naphthol sulphuric acids, $CH_2 \cdot NH_2$, or $NH \cdot CH_3$ in the aliphatic or aromatic portion or both. As an example, *p*-acetophenone arsenic acid or antimonia acid is dissolved in caustic soda and boiled with mercuric oxide.

208,516. DISTILLATION OF MOLASSES, ETC. Syndicat d'Etudes Chimiques, 13, Rue Brederode, Brussels. International Convention date, December 15, 1922.

Sugar molasses, distilling vinasses, etc., are mixed with lime and other alkali and distilled in cloud retorts under reduced pressure. In the case of molasses which has been desugared with strontium hydrate, the products are ammonia, trimethylamine, acetone, and a non-nitrogenous tar. The residue contains decolorizing carbon and mineral substances.

208,548. CENTRIFUGAL SEPARATORS. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London. (Assignees of H. Plauson, 26, Jarrestrasse, Hamburg, Germany.) International Convention date, December 13, 1922.

Material to be separated is supplied through an opening 15 and is distributed by plain or spiral ribs 8 on a sieve 7 which consists of superposed perforated or slotted plates, or wire netting. The liquid passes through the sieve into the vessel 11 and is drawn off through the pipe 12 and the solid material is



208,548

thrown to the periphery of the sieve 7. The periphery is in spring engagement with a ring 16 of thin sheet metal carried by the cover 14 of the apparatus, so that when the centrifugal pressure of the solid material is sufficiently high, an annular opening is produced through which the material is discharged into the casing 13. The ring 16 may be omitted, and the rim of the sieve 7 made sufficiently thin to act as a spring against the cover 14. The areas of the engaging parts may be varied by shaping them as in Fig. 4.

208,555. DECOLORISING CARBON. Naamlooze Vennootschap Algemeene Norit Maatschappij, 2, Den Texstraat, Amsterdam. (Assignees of J. N. A. Sauer, 2, Den Texstraat, Amsterdam.) International Convention date, November 19, 1921.

Distilled carbonaceous material such as coke or charcoal is prepared for activation by passing through it the gases from the second stage of the process, and is then activated by heat and steam, carbon dioxide, carbon monoxide, air, hydrogen, chlorine, retort gases, volatilised chlorides, water gas, coke oven gas, or producer gas. Calcium or magnesium carbonate, quicklime, slaked lime, calcium, magnesium, ammonium or sodium chloride may also be added to the carbon. The retort may be heated externally or internally by combustible gases. The reaction gases may be mixed with hot inert gases before being used for the preparatory treatment first mentioned.

208,689. ACETALDEHYDE. Canadian Electro Products Co., Ltd., 83, Craig Street West, Montreal, Canada. (Assignees of H. S. Reid, and W. C. Hovey, Shawinigan Falls, Quebec, Canada). International Convention date, December 21, 1922.

The catalytic hydration of acetylene is effected by passing the gas into sulphuric acid of 3-40 per cent. strength containing a catalytic material such as mercurous sulphate. The gas is passed through at a rate at least 200 per cent. in excess of the rate of combination, and mechanical stirring and external cooling are then unnecessary. In an example, the reaction is effected in a vessel having an inverted conical bottom, at the apex of which the gas is forced into the liquid. The temperature is 60°-85° C., and water and mercurous sulphate are added periodically to replace losses. The acetaldehyde is condensed out of the acetylene, which is returned to the vessel. The mercury sludge obtained by reduction of the catalyst, may be reconverted into mercurous sulphate for use again.

208,720-1-2. PERYLENE. Compagnie Nationale de Matières Colorantes et de Products Chimiques, 134, Boulevard Haussmann, Paris. International Convention date, December 21, 1922.

208,720. Diamino-dinaphthyl (naphthidine) or a salt or derivative, is heated with a ring-closing condensing agent such as aluminium or ferric chloride and an alkali, and the product is oxidised to a quinone. The quinone may be treated with a solvent to purify it. In an example, naphthidine and aluminium chloride are heated, the product pulverised, washed with dilute hydrochloric acid, and treated with sodium bichromate and sulphuric acid, or nitrous acid and sulphuric acid. The residue forms a red vat, and the dye is precipitated on oxidation. A solution in pyridine may be obtained, which dyes cotton yellow, and chloro, nitro, amino and anilido derivatives may be produced.

208,721. To obtain perylene, a dihydroxy compound of α-dinaphthyl or a derivative is distilled with zinc chloride, ferric chloride or ferrous chloride and a reducing agent such as zinc dust or reduced iron, either in vacuo or in a current of inert or reducing gas such as hydrogen or superheated steam. Examples are given of the treatment of β-dinaphthol with molten zinc chloride, zinc dust and water, the distillate being treated with caustic soda and crystallised from toluene yielding perylene. The β-dinaphthol may first be converted into a phosphoric ester by heating with phosphorus oxychloride, and the ester then treated as above.

208,722. A mixture of β-dinaphthol, phosphorus oxychloride and zinc is heated to 200° C., and the product is distilled in a retort at 600° C., yielding perylene and other bodies such as dinaphthylene oxide. Quicklime may be added to fix the phosphorus produced. Perylene is obtained by crystallisation of the distillate from toluene.

LATEST NOTIFICATIONS.

211,096. Method of producing ammonium chloride from ammoniacal hot distillation or generator gases. Christenson, O. L. February 9, 1923.

211,108. Manufacture of new sulphurised compounds of phenols. Farbenfabriken vorm. F. Bayer and Co. February 9, 1923.

211,111. Process of obtaining vanadium compounds or vanadium from pig-iron containing vanadium. Seth, R. H. von. February 9, 1923.

211,120. Manufacture of an indigoid dyestuff. Society of Chemical Industry in Basle. February 9, 1923.

211,125. Manufacture or production of hydrogen and aceytlene from certain gaseous mixtures. Gros. F. February 8, 1923.
211,145. Manufacture of sulphobenzol ethers of resinous condensation products derived from phenols. Farbwerke vorm. Meister, Lucius, and Bruning. February 7, 1923.
211,167. Manufacture of acetic anhydride. Wacker Ges. für Elektrochemishe Industrie Ges., Dr. A. February 12, 1923.

Specifications Accepted, with Date of Application

186,057. Dyeing or printing textile fibres and other materials' Manufacture of products for. Durand and Huguenin Soc. Anon. September 16, 1921.
189,453. Alcohol, Process of dehydrating. P. Loriette. November 21, 1921.
190,721. Aluminium base alloys. R. S. Archer and Z. Jeffries. December 20, 1921.
199,713. Titanium-nitrogen compounds, Treatment of. Titan Co., Aktieselskabet. June 24, 1922.
201,163. Charcoal, Manufacture of highly active. Farbwerke vorm. Meister, Lucius and Brüning. July 22, 1922.
210,480. Liquids, Purification of. A. L. Benoit. October 3, 1922.
210,517. Aluminium alloys. British Aluminium Co., Ltd., and A. G. C. Gwyer. October 31, 1922.
210,616. Grids and their supports for supporting the purifying material in gas-purifiers. J. A. Spencer. January 23, 1923.
210,628. Sodium compound, Process of manufacture of. H. E. Cocksedge. (*C. Sundstrom and G. N. Tirziev.*) February 6, 1923.
210,652. Electric furnaces. L. W. Wild and E. P. Barfield. March 20, 1923.
210,663. Solid materials, Process and apparatus for the separation, washing and classification of. Maison Beer Soc. Anon., and L. Charlier. April 5, 1923.
210,669. Dyestuffs derived from pyrazolone, Manufacture of—and of intermediate products therefor. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) April 21, 1923.
210,691. Oil bearing shale and the like, Method of and apparatus for extracting volatile matter from. A. L. Mond. (*American Shale Reduction Co.*). May 30, 1923.
210,698. Alkaline earth metal compounds of the organic phosphorus compound contained in milk casein, Manufacture of. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) July 4, 1923.

Applications for Patents

Brightmore, F. S., and Webber, W. H. Manufacture of nitro-derivatives of the chlorhydroxytoluenes. 4,082. February 16.
Bichowsky, F. von., and Harthan, J. Method for production of cyanogen compounds. 3,766. February 13.
Berchers, W., and Stimson, R. W. Purification of alloys containing iron and molybdenum, etc. 3,622. February 12.
British Dyestuffs Corporation, Ltd. (Clems, G. R., and Perkin, W. H.). Manufacture of gamma-tetra-hydroquinolone, etc. 3,642. February 12.
Canada Carbide Co., Ltd., and Freeman, H. Manufacture of sodium sulphide. 3,800. February 14. (United States, February 14, 1923.)
Carpmael, W., and National Electrolytic Co. Manufacture of chromates. 3,993. February 15.
Clayton, A., Holliday and Co., Ltd., L. B., and Stokes, J. A. Orange colouring-matter of the pyrazolone series. 3,704. February 13.
Clayton, A., Holliday and Co., Ltd., L. B., and Stokes, J. A. Yellow colouring-matter of the pyrazolone series. 3,710, 3,711. February 13.
Fabriques de Produits Chimiques de Thann et de Mulhouse. Manufacture of cyanides. 3,961. February 15.
Farbenfabriken vorm. F. Bayer and Co. Apparatus for producing intimate mixture between gases and liquids. 3,782. February 13. (Germany, April 6, 1923.)
Kalle and Co., Akt.-Ges., and Sokal, S. Manufacture of vat dyestuffs. 4,079. February 16.
Knecht, E., and Muller, E. F. Dyestuffs. 3,828. February 14.
Lande, J. C. L. van der, and Naamlooze Vennootschap Industrieele Maatschappij voorheen Noury and Van der Lande. Process for rendering peroxides, etc., safer for handling. 3,685. February 12.
McDavid, J. W., Nobels Explosives Co., Ltd., and Williams, E. Recovery and concentration of nitric acid. 3,529. February 11.
Naamlooze Vennootschap Stikstofbindingsindustrie Nederland. Manufacture of ammonia from products containing cyanides and complex cyanides. 3,763. February 13. (Holland, February 21, 1923.)
Naamlooze Vennootschap Stikstofbindingsindustrie Nederland. Furnace for chemical reactions. 3,902. February 14. (Holland, March 13, 1923.)
Naugatuck Chemical Co. Compounding rubber, etc. 3,865. February 14. (United States, July 13, 1922.)
Schwarz, A. Treatment of hydrocarbons. 3,785. February 13. (United States, February 13, 1923.)
Shore, W. E. Process for constructive conversion of heavy to light hydrocarbons. 3,742. February 13.
Soc. Anon. Compagnie Générale des Produits Chimiques de Louvres. Manufacture of salts of chrome. 4,086. February 16. (France, February 16, 1923.)
Soc. of Chemical Industry in Basle. Manufacture of thionaphthisatin, etc. 3,548. February 11. (Switzerland, July 18, 1923.)
Stewart, R. F., and Walmsley, W. A. Purification of cresylic acid. 3,702, 3,703. February 13.
Wacker Ges. für Elektrochemische Industrie Ges., Dr. A. Manufacture of acetic anhydride. 3,663. February 12. (Germany, February 12, 1923.)
Wilhelm, K. F. Extraction, etc., of fatty acids, etc., from oils, etc. 3,619. February 12. (Germany, December 24, 1923.)

The Corporation Profits Tax

Mr. Philip Snowden's Views

We have the strong support (in theory at any rate) of Mr. Philip Snowden in our agitation for the abolition of the Corporation Profits Tax. In April last, before, of course, he became Chancellor of the Exchequer, Mr. Snowden, in the House of Commons, said that the Labour Party was not opposed to the abolition of the Corporation Profits Tax. They thought it was a very bad tax. "I will only add this," Mr. Snowden continued: "If a saving in taxation were likely to improve the commercial position at all, the abolition of the Corporation Profits Tax would be much more likely to do so than a reduction of Income Tax, for this reason, that the saving would go into the reserve fund of the country and would be available for capital or semi-capital expenditure."

No one could have stated the case against the tax better, and we can but wait patiently to see whether Mr. Snowden has the courage to translate his words into action. Should he decide to abolish this stupid tax in the forthcoming Budget he will find many helpers on both sides of the House. The difficulty is to find any coherent body of opinion in favour of its continuance. If those who suffer from the imposition of this tax brought pressure to bear on their members of Parliament there could be no doubt about its speedy abolition.

Modern Soap Making

At the annual meeting of John Knight, Ltd., held in London on Friday, the chairman (Mr. S. L. Buchanan), in the course of his speech, said the manufacture of soap to-day was quite a different proposition from what it was 106 years ago, when the firm first started. To-day the soapmaker must be not only a soap-boiler but a scientific oil refiner. All the materials used have to be subjected to a preliminary refining process, whereas formerly anything was considered good enough for soap-making. To-day the up-to-date soapmaker has to select his materials very carefully, and then has to subject them to drastic refining before he will allow them to go to the soap kettle. After his materials have been refined he has to use all the experience at his command to blend these materials to produce a soap which will give the highest possible efficiency in washing at the minimum cost to the consumer. In this country the manufacture of soap had reached a higher plane of scientific perfection than in any other.

Magadi Soda Co., Result of Polls

The secretary of the Magadi Soda Company announces that the polls taken at the extraordinary general meeting held on February 13 (see The Chemical Age, February 16, p. 170) in respect of (1) the amended resolution proposed at the meeting; and in respect of (2) the extraordinary resolution set out in the notice convening the meeting resulted as follows:—

(1) The amendment—votes against, 638,174; votes in favour, 124,702; majority against, 513,472. The amendment, therefore, was not carried.

(2) The resolution—votes in favour, 638,372; votes against, 124,047; total votes polled, 762,419. The voted polled in favour of the extraordinary resolution being in excess of three-fourths of the total votes polled, the extraordinary resolution has been carried.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers ; those interested in close variations in prices should study the market report.*

London, February 21, 1924.

THE early part of last week witnessed a fairly active business and a scramble on the part of many consumers to secure supplies of necessary commodities in view of the approaching dock strike. The onset of the strike has largely paralysed business, but we are glad to note an apparent settlement as we go to press. Industrial unrest at a time when trade seems to be improving is deplorable.

Prices generally tend upwards and the movement does not seem likely to be arrested at present.

Export business is fair although many of the limits from overseas are impracticable in view of the improving markets on this side.

General Chemicals

ACETONE is very scarce for prompt delivery. The limited stocks are strongly held and the market is very firm.

ACID ACETIC is in good demand and the price is well maintained.

ACID CITRIC has advanced in price.

ACID FORMIC remains scarce and the price is nominal.

ACID LACTIC is unchanged.

ACID OXALIC is firmer and spot supplies command a premium.

ACID TARTARIC has advanced in price.

BARIUM CHLORIDE is unchanged.

BLEACHING POWDER.—Unchanged.

FORMALDEHYDE.—Stocks are small and command a high price.

LEAD ACETATE is in short supply due to the operation of the German Reparation (Recovery) Act, and prices are higher.

LIME ACETATE.—Unchanged.

LITHOPONE.—Unchanged.

METHYL ALCOHOL is short for early delivery and the price is advancing in all positions.

POTASSIUM CAUSTIC AND CARBONATE.—Unchanged.

POTASSIUM PERMANGANATE is without special feature.

POTASSIUM PRUSSIATE.—The improvement is maintained.

SODA ACETATE is firm and scarce.

SODA BICHROMATE.—Unchanged.

SODA NITRATE.—Stocks are in very few hands and the price is very firm.

SODA PHOSPHATE.—Unchanged.

SODA PRUSSIATE.—The improvement indicated last week seems likely to develop. There are few sellers at the present depressed price.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID has been fairly active with the tendency easier.

ACETANILID is in good demand and the price is well maintained.

ACID SALICYLIC is cheaper.

AMIDOPYRIN.—Home trade demand is smaller, with the price in buyers' favour.

BROMIDES are quiet, price unchanged.

CHLORAL HYDRATE is easier.

HYDROQUINONE.—Price has been cut in some directions, but is expected to advance when the demand improves.

METHYL SALICYLATE is weaker.

PARALDEHYDE is in buyers' favour.

PHENACETIN.—Some dealers have forced sales at lower prices.

PHENAZONE.—The Continental movements have led to some price cutting.

PHENOLPHTHALEIN is easier.

SODA SALICYLATE is weaker in sympathy with salicylic acid. The best Continental brands, however, find a ready sale at last prices.

Coal Tar Intermediates

There has been slightly more interest shown in this market during the past week, and on the whole prices are without much change.

ALPHA NAPHTHOL has been inquired for on export account.

ALPHA NAPHTHYLAMINE.—A fair business has been passing.

ANILINE OIL AND SALT.—Some home trade business has been placed, and there is also more demand for export account.

BENZIDINE BASE is unchanged.

BETA NAPHTHOL has been inquired for on export account, and home business continues on moderate lines.

DIMETHYLANILINE has been of less interest than of late.

DIPHENYLAMINE is unchanged.

" H " ACID.—Some business has been placed for home trade.

NITRO BENZOL has been on the quiet side without change in value.

PARANITRANILINE is without special feature.

" R " SALT is unchanged.

XYLIDINE has been of interest for home trade account.

Coal Tar Products

There is no great change in the market for coal tar products since last week.

90% BENZOL remains unchanged from last week, being firm in price at 1s. 6d. per gallon on rails.

PURE BENZOL is quoted at 1s. 10d. per gallon on rails.

CREOSOTE OIL is slightly weaker, and is worth from 8¼d. to 8⅜d. per gallon on rails in the North, while the price in London is 9d. to 9¼d. per gallon.

CRESYLIC ACID is steady at 1s. 10d. per gallon on rails for the Pale quality 97/99%, while the Dark quality, 95/97% is quoted at 1s. 6d. to 1s. 8d. per gallon on rails.

SOLVENT NAPHTHA is firm at 1s. to 1s. 1d. per gallon on rails, with an upward tendency.

HEAVY NAPHTHA shows no change from last week.

NAPHTHALENES are unchanged, the lower qualities being worth from £7 to £7 10s. per ton, 74/76, £8 to £8 10s., and 76/78 £9 to £9 10s. per ton.

PITCH.—A slight improvement in demand has been noticed, and prices are steady. To-day's values are 60s. to 65s., f.o.b., London ; 60s. to 62s. 6d., f.o.b., East Coast ; 57s. 6d. to 60s., f.o.b., West Coast.

Sulphate of Ammonia

The demand is active, and prices are well maintained.

Bleaching Works Fatality

THE adjourned inquiry into the death of Alfred Bamford, aged 16, who was overcome by fumes in a bleaching kier on January 30, at the Smedley Bridge Bleaching and Dyeing Works of Joseph Jackson and Co., Manchester, was conducted by the Manchester City Coroner (Mr. C. W. W. Surridge), on Friday, February 15. Evidence was given by a foreman bleacher to the effect that about 250 gallons of water were run into the kier and five buckets of caustic soda added, followed by two gallons of a substance called tetralene. He had not seen a label on the barrel containing the latter substance, "Neutral but powerful, powerful but harmless." Questioned with regard to the tetralene, Mr. E. Jackson, a partner in the firm, said no instructions were sent by the sellers ; pamphlets were sometimes sent, though he had seen no warning that the stuff was dangerous. Further questioned, witness said the instructions issued by the manufacturers were not carried out, because he did not think it would make any difference if the mixture was harmless. During all the years the firm had been using tetralene it had had no ill-effects at all, although used in exactly the same manner as on this occasion. Mr. Percy Bean, analytical chemist, said the liquor ought not to have been heated in an enclosed kier as vapours would form. He did not consider the quantity of tetralene employed was excessive. A verdict of "Accidental death" was returned, the Coroner stating that while there had been no criminal negligence he thought the firm should have had the advice of someone who thoroughly understood the substance. He was satisfied that the manufacturers of tetralene had taken sufficient precautions to warn people of the danger.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	120	0	0	to	123	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	51	0	0	to	53	0	0
Acetic, 40% pure	ton	26	0	0	to	27	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	7¾	to	0	0	8
Citric	lb.	0	1	5¼	to	0	1	6
Formic, 85%	ton	67	10	0	to	70	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	39	0	0	to	40	0	0
Lactic, 60 vol.	ton	45	0	0	to	47	0	0
Nitric, 80 Tw.	ton	23	0	0	to	25	0	0
Oxalic	lb.	0	0	5¾	to	0	0	6
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	0¾	to	0	1	1
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	66	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	14	10	0	to	15	0	0
Nitrate	ton	37	0	0	to	40	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to	—		
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	77	0	0	to	80	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	65	0	0	to	66	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	20	0	0	to	22	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	47	0	0	to	48	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	48	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol 1% acetone	ton	85	0	0	to	86	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to	—		
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to	—		
Metabisulphite, 50–52%	ton	63	0	0	to	65	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	2	6	to	0	2	8
Prussiate, yellow	lb.	0	0	9¼	to	0	0	10
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to	—		
Seconds	cwt.	2	17	6	to	—		
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4¼	to	—		
Bisulphite, 60–62%	ton	20	0	0	to	22	0	0
Chlorate	lb.	0	0	2¾	to	0	0	3
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	5¾	to	0	0	6
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62%	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	0	to	0	1	1
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

	Per	£	s.	d.		£	s.	d.
Acetyl salicylic acid	lb.	0	3	6	to	0	3	9
Acetanilid	lb.	0	3	0	to	0	3	3
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	10	to	0	3	3
Salicylic, B.P.	lb.	0	2	2	to	0	2	4
Tannic, leviss.	lb.	0	3	0	to	0	3	3
Amidol	lb.	0	7	6	to	0	8	0
Amidopyrin	lb.	0	13	9	to	0	14	3
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	17	0	to	0	17	6
Beta naphthol resublimed	lb.	0	3	0	to	0	3	6
Bromide of ammonia	lb.	0	0	10½	to	0	1	0
Potash	lb.	0	0	8½	to	0	0	9
Soda	lb.	0	0	9¼	to	0	0	10
Caffeine, pure	lb.	0	12	3	to	0	12	9
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	3	4	to	0	3	6
Chloral hydrate	lb.	0	3	10	to	0	4	1
Cocaine alkaloid	oz.	1	2	6	to	1	5	0
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	2	10	to	0	3	0
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	4	to	0	2	6
B.P. (75–80% eucalyptol)	lb.	0	2	5	to	0	2	7
Guaiacol carbonate	lb.	0	13	0	to	0	13	3
Liquid	lb.	0	11	6	to	0	12	0
Pure crystals	lb.	0	12	6	to	0	13	0
Hexamine	lb.	0	4	0	to	0	4	3
Hydroquinone	lb.	0	4	0	to	0	4	3
Lanoline anhydrous	lb.	0	0	7	to	0	0	6
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	10	to	0	3	3
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	5	0	to	4	10	0
Paraldehyde	lb.	0	1	6	to	0	1	9
Phenacetin	lb.	0	7	0	to	0	7	3
Phenazone	lb.	0	7	6	to	0	8	0
Phenolphthalein	lb.	0	7	9	to	0	8	0
Potassium sulpho guaiacolate	lb.	0	6	3	to	0	6	9
Quinine sulphate, B.P.	oz.	0	2	3	to	—		

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	6	0	to	0	6	6
Salicylate of soda powder	lb.	0	2	10	to	0	3	0
Crystals	lb.	0	3	0	to	0	3	3
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	6	to	0	3	9
Sulphonal	lb.	0	17	6	to	0	18	3
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	4	6	to	1	5	6

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	8¾
Salts	lb.	0	0	9	to	0	0	9½
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	4	to	0	4	7
Sulphate	lb.	0	3	4	to	0	3	7
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	9	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	10	to	0	0	11
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	8	to	0	2	10
Diphenylamine	lb.	0	3	3	to	0	3	6
H-Acid	lb.	0	4	6	to	0	4	9
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-**amidophenol, base**	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	6	to	0	2	8
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.

		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay		0	10	6
Bergamot	dearer	0	15	6
Cajuput		0	3	3
Camphor, white	per cwt.	3	15	0
Brown	,,	3	10	0
Cassia	firmer, c.i.f. 6/3 spot	0	8	9
Cedarwood		0	1	6
Citronella **(Ceylon)**	decidedly firmer, c.i.f. 3/2 spot	0	3	8
(Java)	very firm, c.i.f. 4/6 spot	0	4	9
Clove	easier	0	8	9
Eucalyptus	,,	0	2	3
Geranium Bourbon		1	11	0
Lavender		1	5	0
Lavender Spike	dearer	0	5	0
Lemon	firmer	0	3	1
Lemongrass	firm, per oz.	0	0	2¾
Lime (distilled)		0	4	6
Orange sweet (Sicilian)		0	11	6
(West Indian)		0	9	6
Palmarosa		0	18	0
Peppermint **(American)**		0	16	0
Mint (dementholised Japanese)	dearer	0	14	0
Patchouli		1	5	0
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	11
Sandalwood		1	5	0
Sassafras		0	10	6
Thyme	2/6 to	0	8	0

Synthetics.

			£	s.	d.
Benzyl acetate		per lb.	0	3	3
Benzoate		,,	0	3	6
Citral		,,	0	10	0
Coumarine		,,	1	0	0
Heliotropine		,,	0	8	0
Ionone		,,	1	5	0
Linalyl acetate		,,	1	2	6
Methyl salicylate	easier	,,	0	2	10
Musk xylol		,,	0	18	0
Terpeniol		,,	0	2	9

Resignation of Magadi Soda Director

On Monday, before Alderman Sir David Burnett, at the Guildhall Police Court, London, the Magadi Soda Company (Limited) was summoned, on the information of Mr. A. P. Pennel, for not filing with the Registrar of Joint Stock Companies notice of the retirement of Lieut.-Colonel Charles Hyde Villiers, a previous director of the company. Mr. Samuel Samuel, M.P., and Captain the Hon. Walter Horace Samuel were also summoned for wilfully and knowingly permitting the omission.

Mr. F. G. Enness, for the prosecution, said that Colonel Villiers had been a director of the company since its inception. He was, in fact, the discoverer of the vast lake of soda which existed in Africa, and a director in whom the shareholders had great confidence. On June 18 very important changes were proposed in the constitution of the company, and it was at this period that Colonel Villiers resigned. Apart from the announcement to the small number of persons present at the meeting on June 18 no notification whatever had been given to the shareholders.

Evidence was given by Lieutenant-Colonel Villiers of resigning from the directorate of the company owing to a difference of opinion with Mr. Samuel on the question of reconstruction and the treatment of the deferred shareholders. He was a director of many companies, but he would not have thought it necessary to notify Somerset House.

The magistrate said that he was of the opinion that the directors had not wilfully and knowingly committed the omission to notify Somerset House, and he dismissed the summonses against Mr. Samuel and Captain Samuel, with three guineas costs in each case against the prosecution. The company was fined three guineas, but the magistrate declined to allow any costs against them.

Research at Bristol University

A meeting of the Bristol section of the Society of Chemical Industry was held in the University of Bristol on Friday, February 15. There was an excellent attendance numbering between 70 and 80. The evening was devoted to an account of some of the investigations being carried out in the Chemical Department of the University. The meeting was held under a scheme of co-operation with the Chemical Society of London, for presenting scientific papers before publication, and five papers were considered. Professor F. Francis gave a brief account of the present position of the investigation being carried out on the composition of paraffin wax. Dr. Wallington, dealt with the "Reduction of aromatic nitro-compounds," and Mr. D. G. Hopkins, B.Sc., gave the various explanations of adhesives which have been propounded, and demonstrated apparatus with which their properties are tested.

Professor McBain and Mr. A. Baker, M.Sc., exhibited silica apparatus specially designed to show sorption of gases and vapours in progress, which may help in clearing up some of the points at present in dispute. Dr. R. C. Menzies concluded the proceedings by a short paper on the "Applications of certain compounds of thallium."

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, February 20, 1924.

THERE is little of importance to record this week, the heavy chemical market remaining quiet, although there was a moderate demand for spot lots of various articles, in view, no doubt, of the threatened dock strike.

Prices both for home and continental products are on about the same level as last reported.

Industrial Chemicals

ACID ACETIC.—Spot material inclined to be scarce, with consequent advance in prices quoted. Glacial 98/100%, £62 to £70 per ton; 80% pure, £51 to £53 per ton; 80% technical, £47 to £50 per ton, all packed in casks, delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Quoted prices remain unchanged at about 7d. per lb., but demand still very poor.

ACID CITRIC, B.P. CRYSTALS.—Moderate inquiry, with prices inclined to be higher. Now quoted 1s. 5d. per lb., less 5 per cent. carriage paid.

ACID FORMIC 85%.—Spot material still extremely scarce. Quoted £73 to £77 per ton, ex store. Offered for early delivery at about £67 per ton, ex wharf.-

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Unchanged at 5½d. per lb., ex store. Little inquiry..

ACID SULPHURIC 144°.—£3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Spot lots remain unchanged at about 1s. 1d. per lb., less 5 per cent. ex store. Offered for early delivery at 1s. per lb., less 5 per cent. ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—Moderate inquiry. Spot lots, about £8 10s. per ton, ex store. Offered for forward delivery at about £7 7s. 6d. per ton, c.i.f. U.K. port.

ALUM, CHROME.—Potash chrome alum quoted about £27 per ton, ex station. Ammonium chrome alum about £20 to £21 per ton, ex store. Moderate inquiry for export.

ALUM, POTASH (LUMP).—Offered from the Continent at about £10 per ton, c.i.f. U.K. port. Spot lots quoted £10 15s. per ton, ex store.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £35 per ton. Powdered, £37 per ton, packed in casks, carriage paid U.K. station.

AMMONIUM LIQUID 880°.—Unchanged at 3d. per lb., delivered, containers extra.

AMMONIA MURIATE.—Moderate inquiry for Grey galvanisers' quality, now quoted £30 to £32 per ton, ex station, spot delivery. Fine white crystals offered from the continent at £27 per ton, c.i.f. U.K. port.

AMMONIA SULPHATE.—25¼%, £13 10s. per ton; 25¾%, £14 13s. per ton, ex works, prompt delivery.

ARSENIC, WHITE POWDERED.—Spot lots unchanged at about £70 to £71 per ton, ex store. Offered for forward delivery at about £69 per ton, ex wharf.

BARIUM CHLORIDE 98/100%.—English material on offer at £14 10s. per ton, ex store. Offered from the continent at about the same price, ex wharf.

BARYTES.—Rather better inquiry. Finest English white, unchanged at £5 5s. per ton, ex works. Good quality continental offered at £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots, £11 per ton, ex station; contracts, 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Offered from the continent at about £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Quoted £3 per ton, f.o.b. U.K. port, packed in casks.

COPPER SULPHATE.—Quoted £25 per ton, carriage paid stations or f.o.b. U.K. port.

FORMALDEHYDE 40%.—Quoted £62 to £63 per ton, ex store, spot delivery, but little demand.

GLAUBER SALTS.—English material, £4 per ton, ex store or station. Continental offering at about £3 5s. per ton, c.i.f. U.K. port.

LEAD RED.—English manufacturers advise advance in price of 20s. per ton. Now quoted £41 per ton, less 2½ per cent. carriage paid U.K. stations. Continental on offer at £38 15s. per ton, ex store, spot delivery.

LEAD WHITE.—Continental material inclined to be dearer. Now quoted £43 per ton, ex store, spot delivery.

LEAD ACETATE.—White crystals unchanged at about £47 to £48 per ton, ex store, spot delivery. Offered from the Continent at about £46 per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Finest English ground material offered at £8 per ton, ex station. Moderate inquiry for export.

MAGNESIUM CHLORIDE.—Quoted £3 10s. per ton, ex store, spot delivery. Offered from the continent at about £3 5s. per ton, c.i.f. U.K. port.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality offered at about £5 per ton, ex store. B.P. quality, £6 5s. per ton, ex station, prompt delivery.

POTASH CAUSTIC, 88/92%.—Offered from the continent at about £28 10s. per ton, c.i.f. U.K. port. Spot lots quoted £32 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE 96/98%.—Quoted £24 per ton, c.i.f. U.K. ports, early delivery. Spot lots on offer at about £27 5s. per ton, ex store.

POTASSIUM CHLORATE.—Little inquiry. Spot lots unchanged at about 3¼d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Offered from the continent at £25 10s. per ton, c.i.f. U.K. port prompt shipment. Spot lots on offer at about £31 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 10d. per lb., ex store, spot delivery. In little demand.

POTASSIUM PRUSSIATE (YELLOW).—Nominally 9d. per lb., f.o.b. U.K. port for export, but could probably be obtained for less. The same price quoted for delivery, ex station.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Quoted £24 10s. per ton, ex store, spot delivery. Offered for early delivery at about £24 per ton, ex wharf.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English makers' price unchanged at 4½d. per ob., D/d.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English makers' price about £10 per ton, ex station. Continental obtainable at about the same figure. Pea crystals quoted £15 per ton ex store.

SODIUM NITRATE.—Refined 96/98% quality quoted £13 10s. per ton, f.o.r. or f.o.b. U.K.

SODIUM NITRITE, 100%.—Quoted £26 10s. to £28 10s. per ton, according to quantity, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Unchanged at about 5d. per lb., f.o.b. U.K. port for export. Spot material available at about 5½d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption, £4 5s. per ton, carriage paid stations. Good export inquiry.
SODIUM SULPHIDE.—60/62% solid, £15 per ton, ex station; broken, £1 per ton more; 31/34% crystals, £9 7s. 6d. per ton, ex station.
SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.
TIN, CRYSTALS.—Now offered at 1s. 3d. per lb., f.o.b. U.K. port.
ZINC CHLORIDE, 98/100%.—Quoted £26 per ton f.o.b., U.K. port for export.
ZINC SULPHATE.—English material offered at about £13 10s. per ton, ex store. Continental at about the same figure.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ANILINE OIL.—Prices are lower at 7¾d. lb., delivered, returnable drums.
ANILINE SALT.—Price 7¾d. lb., delivered, casks included.
BENZALDEHYDE.—Good home inquiry. Price 2s. 6d. lb., delivered.
BENZOIC ACID.—Export inqury. Price, 1s. 9d. lb., f.o.b.
GAMMA ACID.—Home inquiry. Price quoted 11s. 11d. lb., 100% basis.
H ACID.—Little business. Price, 4s. 6d. lb., delivered.
NITROBENZOL.—Is weak at 7¼d. lb., delivered.
PARANITRANILINE.—Good demand for both home trade and export, 2s. 4½d. lb. delivered, or f.o.b.
PARA TOLUIDINE.—Supplies are offered at 4s. 3d. lb., delivered.
SULPHANILIC ACID.—Price 10½d. lb., delivered.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, February 21, 1924.

BUSINESS has been fairly well maintained on the level of the last few weeks, in spite of the fresh trouble in the Labour world, although the dock strike will not need to go on for long before its effects will make themselves felt very severely in the chemical market. Prices have been reasonably steady since last report, with, however, slight concessions in one or two instances. Some trade has been done with colonial markets, and inquiries are said to be fairly numerous. Business on Continental account continues on a very restricted scale.

Heavy Chemicals

Sulphide of sodium is still a quiet section, with quotations maintained at £14 10s. to £15 per ton for 60-65 per cent. concentrated solid, and £9 5s. for crystals. Hyposulphite of soda also attracts only small attention, though prices are fairly steady; photographic crystals are offering at £14 10s. to £15 and commercial at £9 10s. per ton. Bleaching powder is in moderate inquiry and unchanged at round £10 per ton. The demand for saltcake from home consumers is still rather quiet, though values are steady at £4 10s. per ton; foreign business, however, continues active. Glauber salts are now offering at about £3 10s. per ton; little improvement in buying interest can be reported. Caustic soda is about unchanged either in position or value, quotations ranging from £16 17s. 6d. for 60 per cent. to £19 7s. 6d. per ton for 76-77 per cent. material; the demand both for home consumption and for shipment keeps up. Prussiate of soda is inactive at about 5¼d. per lb. Phosphate of soda is rather easier at £13 10s. to £14 per ton, and business is only on a modest scale. A fair volume of trade is being put through in bichromate of soda, and values are steady at 4½d. per lb. Bicarbonate of soda is about unchanged at £10 10s. per ton, with demand still quiet. Alkali is steady and in active inquiry at £6 15s. to £7 per ton for 58 per cent. material. Soda crystals are on last week's level of £5 5s. per ton, with only a small amount of business being done. Acetate of soda is quiet but fairly steady at £23 10s. per ton. Nitrite of soda is in rather short supply at £28 per ton. Chlorate of soda is inactive and values are easy at round 2¾d. per lb.

Caustic potash and carbonate of potash are said to be less firm than they have been for some time; caustic is quoted at round £30 per ton for 90 per cent. strength, and carbonate at £26 to £27 for 88-92 per cent. Yellow prussiate of potash continues rather quiet but steady at 8¾d. per lb. Chlorate of potash is inactive at about 3d. per lb. Bichromate of soda is steady and in moderate inqnïry at 5¾d. per lb. Permanganate of potash is quiet, but without quotable change at 8d. per lb. for commercial qualities.

Actual business in arsenic has been on a small scale, though good inquiries for export business are coming through; values are fairly steady at round £67 per ton, Manchester, for white powdered, Cornish makes. Sulphate of copper still hovers round £25 per ton, and little improvement in this material can be reported. Commercial Epsom salts are quiet but steady at £4 10s. per ton; magnesium sulphate, B.P., is quoted at £6 10s. Acetate of lime keeps scarce and firm at £22 for grey and £15 per ton for brown. Acetate of lead is also maintained at round £47 for white and £46 per ton for brown. Nitrate of lead keeps quiet but steady at £42 to £43 per ton.

Acids and Tar Products

The acid section, with the exception of acetic, is dull. Tartaric acid is on offer at 1s. 1½d. and citric at 1s. 4½d. per lb., demand in both cases being quiet. Oxalic acid keeps featureless at round 5½d. per lb. Acetic acid is firm at £48 per ton for 80 per cent. commercial and £70 for glacial.

Pitch continues quiet and more or less nominal at £2 15s. per ton. Naphthalenes are easier again, refined at about £16 and crude qualities from £5 per ton upwards. Creosote oil meets with a fair demand at 9d. to 9½d. per gallon. Solvent naphtha is steadier at about 1s. 2d. per gallon. Carbolic acid keeps very quiet and the price situation is anything but clear; crude is round 2s. per gallon and crystals at 7½d. to 8d. per lb.

South Metropolitan Gas Co.

Points in Dr. Carpenter's Report

THE ordinary general meeting of the South Metropolitan Gas Co. was held on Wednesday in London, Dr. Charles Carpenter, M.Inst.C.E. (the president), in the chair.

In the course of his speech Dr. Carpenter said: Whatever may be the supposed drawbacks of gas supply, the failure to provide employment for a large number of people is not one of them. An electric generating undertaking of similar capacity could be, and invariably is, run with a much smaller number of employees.

A year ago, Dr. Carpenter said, he had expressed his firm conviction as to the outcome of the inquiry by the Board of Trade into the working of the therm system of valuing gas, and he had not been disappointed. The report of the committee had since been issued, and it was worth remembering that it emphatically supported the therm as a standard of computing gas values and prices. Its proved value to the public had already been great, but he suggested that its indirect advantages would be even greater, since for the first time an unchallengable basis had been laid down by which the working efficiencies of all gas undertakings could be compared and tested, and uncertainty eliminated in the pursuit of higher efficiencies in their most important work of the conversion of raw coal into smokeless fuel.

With regard to the by-products, Dr. Carpenter said: As regards intermediates for the production of dyestuffs the position is one of disappointment. In conjunction with a large organisation of dye manufacturers, we obtained possession of a disused Government factory for the purpose of manufacturing these on a large scale. But the disorganisation of markets, coupled with the low value of the German mark, dissipated our hopes of building up a business profitable alike to our associates as to ourselves and the country, so we brought our undertaking to an end, and wrote off our losses. We are now only making certain special products upon a small scale.

The returns from ammonia are disappointing. For one thing the price does not compare favourably with that realised for nitrate of soda on the nitrogen basis. While it is difficult to account for this I cannot but feel it is in some degree due to the fact that the British production of sulphate is as a whole less efficiently handled than its great competitor in fertilisers. Our export trade in sulphate, very unfairly restrained by the authorities after the war, shows signs of recovery.

The dividend of 5¾ per cent. on ordinary stock was not perhaps, said the chairman, what might have been anticipated, but their all-important duty had been one of restoring their pre-war stability.

Company News

Shawinigan Water and Power Co.—A dividend is announced for the quarter to March 31, at the rate of \$1¾ per cent. on the common shares, payable on April 10.

North Broken Hill.—A dividend of 2s. per share and in addition a bonus of 1s. per share is announced. A year ago the dividend was the same but no bonus was paid.

Chino Copper Co. and the Ray Consolidated Copper Co.—It is reported that the shareholders of both companies have approved the absorption of the Chino Copper Co. by the Ray Consolidated Copper Co., through the exchange of one and two-third share of Ray for one share of Chino.

Harrison, Barber and Co.—The directors recommend a dividend at the rate of 7 per cent. per annum for the six months to the end of December last, making, with the interim dividend, 6 per cent. for the year, the same as in the previous year. The annual meeting will be held at the Cannon Street Hotel, on February 28, at 12 noon.

British Alizarine Co.—The profit for the year 1923 was £44,073 and £36,550 was brought in, making a total of £80,623. The directors have written off £20,000 and propose a dividend of 5 per cent., less tax, for the year, leaving £42,914 to be carried forward. The annual meeting will be held at St. James's Buildings, Oxford Street, Manchester, on February 25, at 3 p.m.

United Alkali Co.—The directors announce a further dividend of 6 per cent., less tax, making 10 per cent. for the year, carrying forward about £96,000, against £86,735 brought in. In April last accounts for two years to December 31, 1922, were submitted. A dividend in respect of the two years of 10 per cent. was paid, plus a bonus of 50 per cent. in fully-paid ordinary shares out of undivided profits.

Joseph Crosfield and Sons, Ltd.—After charging repairs, renewals and alterations, depreciation and insurance, the balance at the credit of profit and loss for the year to November 30 last was £331,269, which is appropriated as follows: Dividend on 5 per cent. cumulative pre-preference shares, £20,000; on 6 per cent. cumulative preference shares, £30,000; on 6½ per cent. cumulative preference shares, £65,000; on 7½ per cent. "A" cumulative preference shares, £112,500; and on the ordinary shares at the rate of 10 per cent., £100,000; leaving £3,769 to be carried forward.

International Paint and Compositions Co., Ltd.—The report for the year ended December 31, states that after writing off bad debts, providing for income tax and depreciation, paying interim dividend on preference shares, and bringing in last year's balance of £3,798, there is available £44,727, which it is proposed to appropriate thus: to reserve, £15,000; balance of preference dividend, £6,000; 5 per cent. for year on ordinary shares, £19,000; carry forward, £4,727. The directors repart that the profit for the past year was substantially higher than the profit for 1922, which was again an advance on 1921, and showed a progressive improvement. Owing to improvements at the works the increased output had been secured at a smaller proportionate cost. It was with special satisfaction that the directors stated that the acquisition of the undertaking of the Standard Anti-fouling Paint Co., Ltd., had brought a substantial amount of business during the past year. This item was shown in the balance sheet at the same value as last year, viz., £143,398 10s.

Bradford Dyers' Association, Ltd.—The accounts for the year to December 31 last show that the net trading profits, after providing an estimated amount in respect of "employés bonus register," income-tax, corporation profits tax, and other contingencies, amount to £1,032,152, to which has to be added £438,369 brought it from 1922, making £1,480,521. From this sum have to be deducted auditors' remuneration, legal and other professional charges, £2,577, interest on debenture stock, £58,150, and depreciation on buildings, plant and machinery, motor vehicles, etc., £232,198, leaving £1,187,596. Out of this have been paid dividends on the preference shares for the year to December 31 last, amounting to £125,000, and on the ordinary shares for the half-year to June 30 last at the rate of 1s. per share, amounting to £67,824. Out of the remaining balance of £994,772 it is recommended that there be allocated to reserve fund (making it £1,125,000) £125,000, and for benefit of employés £125,000; that a dividend on ordinary shares at the rate of 4s. per share be paid for the six months to December 31 last, making 5s. per share for the year, requiring £271,295, and that £473,477 be carried forward. The annual meeting will be held on February 28, and the dividend on the ordinary shares will be paid on March 7.

Borax Consolidated, Ltd.—At the ordinary general meeting, held on Tuesday, at the Cannon Street Hotel, London, the chairman, the Right Hon. the Earl of Chichester, in moving the adoption of the report and accounts, said that this was the silver-wedding year of the company, and it was gratifying to be able to state that they had never passed a dividend during those 25 years—a record which, for an industrial company operating on so large a scale in so many countries over so long a period, must, even if not unique, be considered one of which they might be proud. During the 25 years they had made net profits of £8,388,995, or an average over the whole period of £355,560 a year. The directors had succeeded in arranging a compromise with the Angora Government by which shipments from the company's Turkish mines would be resumed. The arrangement of this matter would facilitate the company's refining operations. Looking to the disturbed condition of trade, it would perhaps have been more conservative to have restricted the dividend to the same percentage as last year, but seeing that the profits admitted of their so doing the directors had decided, as they were dealing with the 25th year of the company's trading, to mark it by paying the bonus of 2½ per cent.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Chemicals and Dyestuffs Required in Sweden.—A commission agent in Gothenburg desires to obtain the representation for Sweden of British manufacturers of chemicals and duestuffs employed in the paper-making industry. (Reference No. 216.)

Demand for Fine and Heavy Chemicals in New Orleans.—H.M. Consul General at New Orleans reports that a local firm is desirous of receiving quotations for iodine, potassium iodide, sodium iodide, potassium bromide, sodium bromide, and other fine chemicals; epsom salt, carbonate of soda, chloride of lime, calcium chloride, bicarbonate of soda, cream of tartar, citric acid, etc. (Reference No. 21940/F.W./C.C. (2).)

Tariff Changes

Germany.—The following are again liable to import licence requirement:—Aniline oil, aniline salts, naphthol, naphthylamine, anthraquinone, nitro-benzol, toluidine, resorcine, phthalic acid and other substances derived from coal tar.

The following may now be imported without licence, into Unoccupied Germany: Heavy benzine, cleaning oil, patent turpentine oil, gas oil, pig iron, ferro aluminium, ferro chrome, ferro manganese and other non-malleable iron alloys, the principal component material being iron, except ferro silicon.

The following goods may now be exported without licence: Polishing or cleaning lime (Vienna lime) and similar mineral substances for grinding, polishing or cleaning, raw, ground or washed; iron oxide, natural and artificial, raw ground or washed, in boxes, etc. Lignite tar, peat and schist oils, boghead and cannel coal tar oils and other mineral oils, not specially mentioned in the tariff, raw or purified; residues from the distillation of mineral oils, containing paraffin or of a tarry nature and residues of a pitchy nature which do not sink in water; resin oil, mixtures of mineral oils. Tars and pitches, except coal tar. Benzol, cumol, toluol, xylol and other light coal tar oils; so-called carburet of hydrogen; heavy coal tar oils, e.g., anthracene, carbolic oil, creosote oil, also asphalt naphtha. Gold chloride in consignments up to 50 grammes net, gold salt and other salts and combinations of gold, not elsewhere mentioned in the tariff; silver salts and combinations not elsewhere mentioned in the tariff, e.g., silver bromide, silver chromate, silver nitrate (except silver nitrate and silver chloride in consignments of over 500 grammes net, which remain subject to licence).

Commercial Intelligence

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

Receivership

ORGANAM, LTD. (R., 22/2/24.) F. Sharman, of 122, Shaftesbury Avenue, W., was appointed receiver on February 13, 1924, under powers contained in a debenture dated December 1, 1923.

London Gazette

Winding-Up Petition

KEMBLE AND CO., LTD. (W.U.P., 23/2/24.) A petition for winding-up has been presented and is to be heard at the County Court House, Quay Street, Manchester, on Wednesday, February 27, at 10.15 a.m.

Companies Winding Up Voluntarily

BRITISH CHEMICAL TRADE ASSOCIATION (in voluntary liquidation). (C.W.U.V., 23/2/24.) A. J. B. Arnold, Port of London Building, Seething Lane, London, appointed liquidator. Meeting of creditors at 80, Fenchurch Street, London, E.C.3, on Wednesday, February 27, at 11 a.m.

NEWHAVEN SILICA CO., LTD. (C.W.U.V., 23/2/24.) A. B. Filson, chartered accountant, 2, Gresham Buildings, Basinghall Street, London, appointed liquidator.

Bankruptcy Information

SENIOR, Joseph, 5, Waverley Place, lately Rupert Street, Radcliffe, Lancs, dyer. (R.O., 23/2/24.) Receiving order, February 12. Debtor's petition.

Application for Discharge

LAMBERT, Robert Morrison (described in the Receiving Order as Robert M. Lambert), 10, Great St. Helens, London, drug merchant. (A.F.D., 23/2/24.) Hearing, March 14, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

Partnership Dissolved

GLOSSIT CO. (Joseph William BUTTERFIELD and John Berry THORNLEY), polish manufacturers, Bank Top, Darwen, by mutual consent as from January 25, 1924. Debts received and paid by J. W. Butterfield, who will continue the business.

New Companies Registered

FUMIGATION SERVICES, LTD., Ocean House, 24-5, Great Tower Street, London, E.C.3. To carry on business relating to the fumigation of buildings, factories, etc., by means of hydrocyanic acid, or other gases. Nominal capital, £1,000 in £1 shares.

CHAS. HANSON AND SON, LTD. Manufacturers of soap, glycerine and household specialities. Nominal capital, £5,000 in £1 shares. A subscriber: C. Hanson, Smith House, Lightcliffe.

NORTH IRISH TAR CO., LTD., 34, Victoria Street, Belfast. Tar and oil distillers and refiners, etc. Nominal capital, £6,000 in £1 shares.

Companies Incorporated Outside the United Kingdom

PARTICULARS of Wolf Sayer and Heller (Incorporated) were filed on February 13, 1924, pursuant to Section 274 of the Companies (Consolidation) Act. The capital is 750,000 dollars in 10 dollar shares. The company was incorporated in the State of Delaware, U.S.A., on January 5th, 1904, to manufacture and deal in provisions, drugs, chemicals, preservatives, spices, condiments, chemical substances, etc. The British address is 7 and 8, Snow Hill, E.C., where E. G. L. Tarrant is authorised to accept service of process and notices on behalf of the company. The first directors are: G. J. Sayer, Chicago; I. Heller, Wisconsin; W. J. Sayer, New York City; E. H. Heller, Chicago; A. C. Oppenheimer, Chicago, and H. W. Davis, Delaware.

British Chemical and Dyestuffs Traders' Association

THE British Chemical and Dyestuffs Traders' Association, Ltd., was registered, on February 14, as a company limited by guarantee and not having a share capital, with an unlimited number of members each liable for three guineas in the event of winding-up. The objects are:—To watch, promote and protect the interests of traders in chemicals and dyestuffs; to provide an effective medium and mouthpiece for voicing the opinions and desires of the trade to Government departments and bodies, and in negotiations with the Colour Users' Committee, or any similar body, or with shipping, railway and other companies or organisations, etc. Unless the Council shall in any particular case otherwise decide no corporation, partnership, firm or individual shall be eligible to become a member of the Association or qualified to remain a member thereof: or to nominate a representative unless it or he is, or to the satisfaction of the Council intends to be, actually engaged directly or indirectly as an importer, exporter, dealer, merchant, agent, broker or distributor mainly of and in (but not solely as manufacturer of) chemicals, dyestuffs, colours, intermediates or any similar commodities, and is domiciled or carries on business in the U.K., including the Free State of Ireland.

The members of the Council are:—V. Blagden, chairman (Victor Blagden and Co., Ltd., London); F. T. T. Reynolds, vice-chairman (Millwards Merchandise, Ltd., Manchester); W. Waugh, hon. treasurer (Walter Waugh and Co., London); H. A. Berens (Old Strand Chemical and Trading Co., Ltd.); A. F. Butler (R. W. Greeff and Co., Ltd., London); A. Connell (A. Connell and Co., London); H. Gilliat (E. G. Jepson and Co., Leeds); G. A. Hamilton (A. and M. Zimmermann, Ltd., London); T. Henderson (T. Henderson and Co., Ltd., Glasgow); S. J. C. Mason (Bush, Beach and Co., Ltd., London); C. Page (Chas. Page and Co., Ltd., London); H. S. Willcock (H. S. Willcock and Co. (Chemicals), Ltd., Manchester). Solicitors:—Stephenson, Harwood and Tatham, 16, Old Broad Street, E.C.2. The registered office is at 80, Fenchurch Street, E.C.

Bankrupt Chemist Discharged

The immediate discharge from bankruptcy, subject to judgment for £10, has been granted at the London Bankruptcy Court in the case of Mr. Adolph Lionel Burlin, Seven Sisters Road, Finsbury Park, consulting chemist.

The receiving order in the case of the applicant was in June, 1923. The liabilities, the Official Receiver reported, were estimated at £115, and assets had only realised a small amount. Born in Russia, applicant came to this country from Holland in 1880 with a small capital. He became a naturalised British subject in October, 1895. Since the war began he became interested in a patented process of his own for obtaining pulp from waste paper, and had also carried on other businesses. He had attributed his insolvency to high cost of alterations and installations at his place of business; also to his failure to recover arrears of salary due to him from a company and to lack of remunerative employment since January, 1923.

The application for discharge was granted as stated.

May and Baker Strike Settled

MAY AND BAKER, LTD., manufacturing chemists, Battersea, in a circular dated February 18, state:—

"We beg to inform you that the strike of a number of the workpeople at both our Battersea and Wandsworth Works, which has been in progress since the 4th inst., is now at an end, as those on strike resumed work unconditionally this (Monday) morning. It was not a quarrel with the firm, but because members of a trade union objected to work with non-unionists. We regret the inconvenience caused through the inevitable delay in execution of orders, but work is now proceeding as usual and we can deal promptly with any demands on us."

Catalogues Received

BRUSH ELECTRICAL ENGINEERING CO., LTD.—The latest mining type of slip-ring induction motor is illustrated in a leaflet issued by the above firm. This has the slip-ring mechanism enclosed in a flame-proof cover which has passed strenuous tests at Sheffield University.